SERV. 34 832

ORDER NO. AD8907219C2

# Service Manual

COMPACT disc DIGITAL AUDIO

DIGITAL

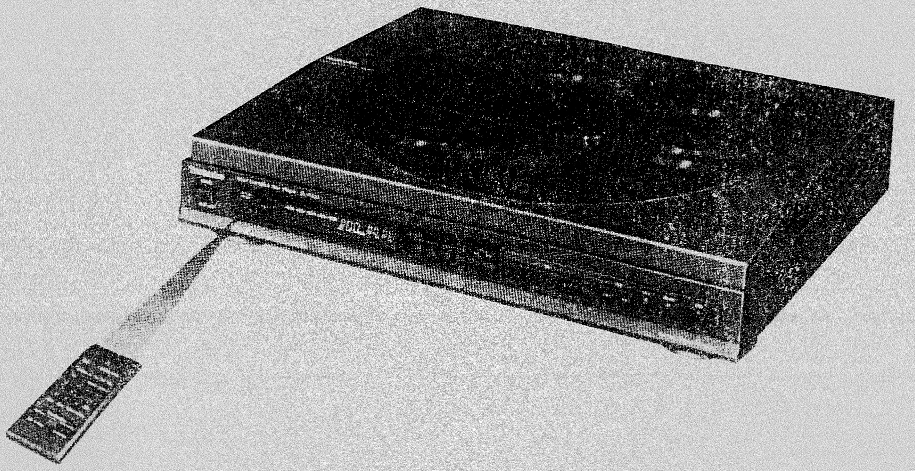
## Multi Compact Disc Player
# SL-PC20

**Color**

| (K)... Black Type |
|---|

**Area**

| Country Code | Area | Color |
|---|---|---|
| (E, E5) | Continental Europe. | (K) |
| (EB) | Great Britain. | (K) |
| (EG) | F.R. Germany and Italy. | (K) |



## SPECIFICATIONS

### Audio

| | |
|---|---|
| No. of channels | 2 (left and right, stereo) |
| Frequency response | 2–20, 000 Hz ± 1 dB |
| Output voltage | 2 V (at 0 dB) |
| Dynamic range | 94 dB |
| S/N ratio | 96 dB |
| Total harmonic distortion | 0.05% (1 kHz, 0 dB) |
| Wow and flutter | Below measurable limit |
| Output impedance | 1 kΩ |
| Load impedance | More than 10 kΩ |

### Signal Format

| | |
|---|---|
| Sampling frequency | 44.1 kHz |
| D-A conversion | 16-bit linear |

### Pickup

| | |
|---|---|
| Wavelength | 780 nm |

### General

| | |
|---|---|
| Power supply | |
| For Great Britain | AC 50/60 Hz, 240V |
| For others | AC 50/60 Hz, 220V |
| Power consumption | 13 W |
| Dimensions (W×H×D) | 430 × 95.5 × 362 mm |
| Weight | 3.9 kg |

Specifications are subject to change without notice.
Weight and dimensions shown are approximate.

**Technics**

**Matsushita Electric Industrial Co., Ltd.**
Central P.O. Box 288, Osaka 530-91, Japan

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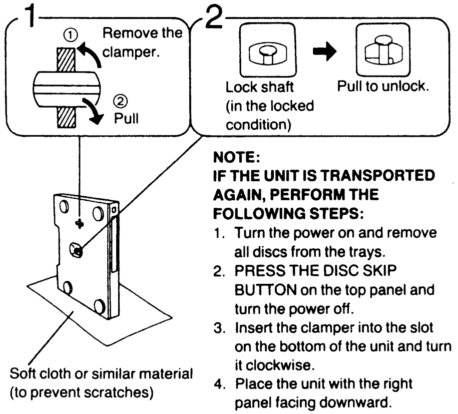
# INSTALLATION

## Transport lock

The optical pickup is secured to prevent damage during transport. Be sure to release it before use.



1
① Remove the clamper.
② Pull
2
Lock shaft (in the locked condition)
Pull to unlock.
Soft cloth or similar material (to prevent scratches)

**NOTE:**
**IF THE UNIT IS TRANSPORTED AGAIN, PERFORM THE FOLLOWING STEPS:**

1. Turn the power on and remove all discs from the trays.
2. PRESS THE DISC SKIP BUTTON on the top panel and turn the power off.
3. Insert the clamper into the slot on the bottom of the unit and turn it clockwise.
4. Place the unit with the right panel facing downward. Press the lock shaft to the LOCK position (▮ ▬ ▲).

**CAUTION:**
Do not transport the unit without locking the lock shaft.
**SEVERE DAMAGE WILL RESULT.**

## Placement notes

- **Place on a flat, level surface so that the front-rear inclination does not exceed 5°.**
- **Avoid places such as the following:**
  - Near any equipment or device that generates strong magnetism.
  - On any heat-generating equipment or device, or in any place where the temperature is high (40°C or higher).
  - Extremely cold places (5°C or below).
  - Near a tuner or TV (It may cause noise in the broadcast, or disturbance of the TV picture.)
  - For long periods of time in direct sunlight.
  - In dusty or smoky locations.
  - In locations prone to vibrations.
  - In locations where the rear panel is less than 10 cm (about 4") away from the wall or back of an audio rack.
  - Within reach of children.
- **When carrying or storing the unit, handle it with care so it is not subjected to any strong bumps.**
  Always remove the disc before storing the unit for any period of time.
- **To avoid problems due to vibration.**
  - Do not place a book or similar object under this unit.
  - Do not route the connection cables (of this or other units) across the operation panel, across the top, or under the unit.

# ACCESSORIES

- AC power supply cord ............... 1
  (SJA187 ..... E, E5, EG)
  (SJA193 ..... EB)
- Remote control transmitter ........... 1
  (EUR64789B)
- Stereo connection cable .............. 1
  (SJP2249–3)
- Batteries ............... 2
  (UM-4NE/2S)
- Dust cover ............. 1
  (RYF0010–K)

# PRECAUTION OF LASER DIODE

**CAUTION:** This product utilizes a laser diode with the unit turned "on", invisible laser radiation is emitted from the pick up lens.
Wave length: 780nM
Maximum output radiation power from pick up: 100μW/VDE

Laser radiation from the pick up lens is safety level, but be sure the followings:

1. Do not disassemble the optical pick up unit, since radiation from exposed laser diode is dangerous.
2. Do not adjust the variable resistor on the pickup unit. It was already adjusted.
3. Do not look at the focus lens using optical instruments.
4. Recommend not to look at pick up lens for a long time.

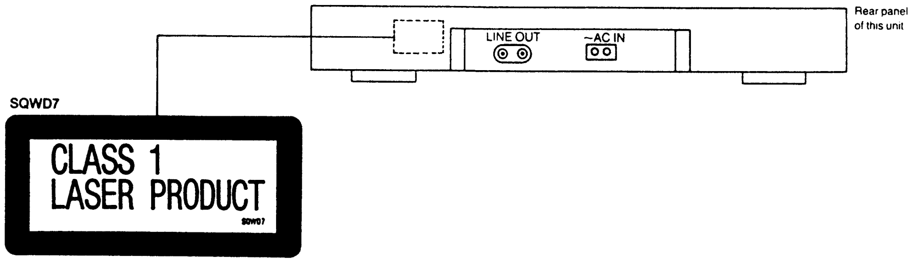
**ACHTUNG:** Dieses produkt enthält eine laserdiode. Im eingeschalteten zustand wird unsichtbare laserstrahlung von der lasereinheit abgestrahlt.

Wellenlänge: 780nM
Maximale strahlungsleistung der lasereinheit: 100μW/VDE

Die strahlung an der lasereinheit ist ungefährlich, wenn folgende punkte beachtet werden:

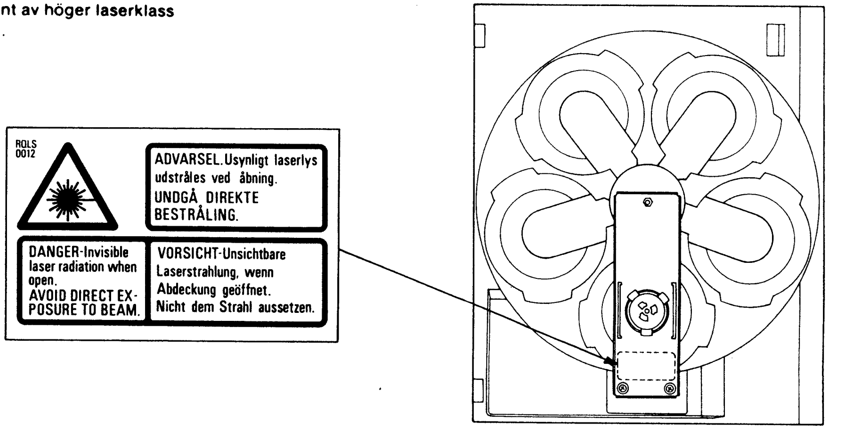
1. Die lasereinheit nicht zerlegen, da die strahlung an der freigelegten laserdiode gefährlich ist.
2. Den werksseitig justierten einstellregler der lasereinreit nicht verstellen.
3. Nicht mit optischen instrumenten in die fokussierlinse blicken.
4. Nicht über längere zeit in die fokussierlinse blicken.

**ADVARSEL: I dette a apparat anvendes laser.**



Rear panel of this unit
LINE OUT
~AC IN
SQWD7
CLASS 1
LASER PRODUCT
SQWD7

Obs:
Apparaten innehåller laser
Komponent av höger laserklass
än klass 1.

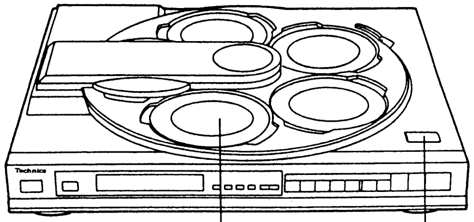


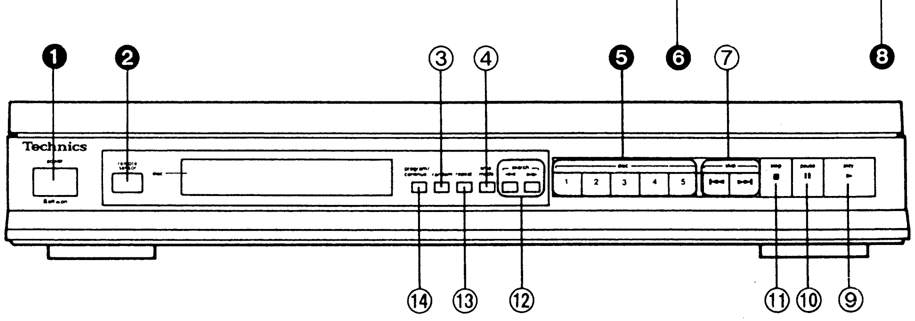
RQLS
0012
ADVARSEL. Usynligt laserlys udstråles ved åbning.
UNDGÅ DIREKTE BESTRÅLING.
DANGER-Invisible laser radiation when open.
AVOID DIRECT EXPOSURE TO BEAM.
VORSICHT-Unsichtbare Laserstrahlung, wenn Abdeckung geöffnet.
Nicht dem Strahl aussetzen.

# ■ FRONT PANEL CONTROLS AND FUNCTIONS

## Control section

***The functions indicated by the black numbers (③ etc.) can also be activated using the remote control transmitter.***





### ❶ Power switch (power)
Press (■–▬) to switch the power on.
Press again (▬–■) to switch the power off.

### ❷ Remote control signal sensor (remote sensor)

### ③ Random button (random)
Press this button to let the microcomputer make a random selection of the sequence in which discs and tracks are played during continuous play or program play.
Press the button again to cancel the random play mode.

### ④ Time mode select button (time mode)
Use this button to select the desired time mode. The display information will change as follows each time the button is pressed.
① Track number and the elapsed play time.
② Track number and remaining time of track now playing.
③ Total track numbers and playing time of the current disc.
④ Total elapsed play time of the current disc.

### ❺ Disc select buttons (disc, 1~5)
These buttons are used to select the desired disc for continuous or program play.

### ❻ Disc trays (1~5)
One disc per tray can be located.

### ⑦ Skip buttons (|◀◀ skip ▶▶|)
Press one of these buttons briefly to move the pickup (backward and forward) to the beginning of a specific track.

**Pickup:**
The pickup is a laser device that reads the information on the disc surface. The pickup moves across the disc as the disc is played, but it is not visible from outside the cabinet.

### ❽ Disc skip button (disc skip)
Each time this button is pressed, the carousel will rotate to the next tray position in a clockwise direction. This allows for loading or unloading of the fifth disc.
This button is also used to select the next disc, in the continuous or random mode.

### ⑨ Play button (▶ play)

### ⑩ Pause button (❚❚ pause)

### ⑪ Stop button (■ stop)

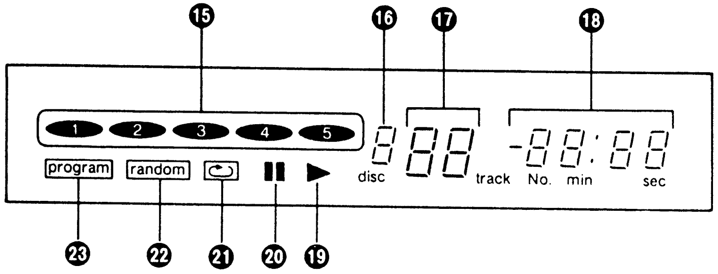
### ⑫ Search buttons (◀◀ search ▶▶)
Use these buttons to move the pickup forward and backward.

### ⑬ Repeat button (repeat)
Press this button to activate the repeat mode. The repeat indicator illuminates.
Press again to cancel the repeat mode. The repeat indicator will no longer illuminate.

### ⑭ Program/continue button (program/continue)
This button is used to select either continuous play or program play.
The selection changes each time the button is pressed.

**Note:**
Continuous play is automatically selected when the power is switched on.

## Display section



### ⓯ Disc indicators ( 1 ~ 5 )
The indicator corresponding to the disc being played flashes during play.
When the unit is in the program mode, these indicators show the programmed discs.

### ⓰ Disc number display (disc)
Disc numbers (1~5) are shown here.

### ⓱ Track number display (track)
Track numbers (up to 99) are shown here.

### ⓲ Time/programmed number display (No., min, sec)
This display shows the elapsed playing time of the track being played. When the unit is in the program mode, this display shows the program sequence.

### ⓳ Play indicator (▶)
Illuminates when the play mode is activated.

### ⓴ Pause indicator (❚❚)
Illuminates when the pause mode is activated.

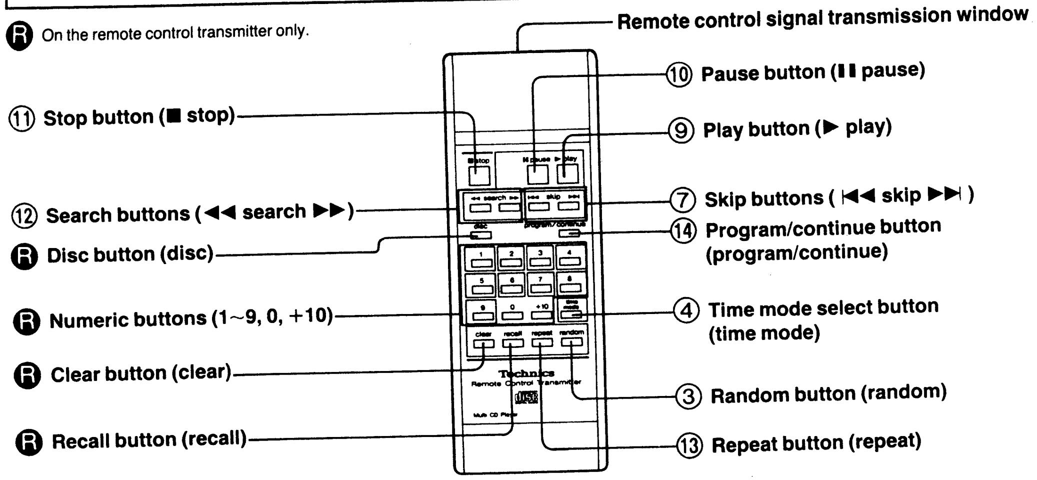
### ㉑ Repeat indicator ( ⟲ )
Illuminates when the repeat mode is activated.

### ㉒ Random indicator ( random )
Illuminates when random play is activated.

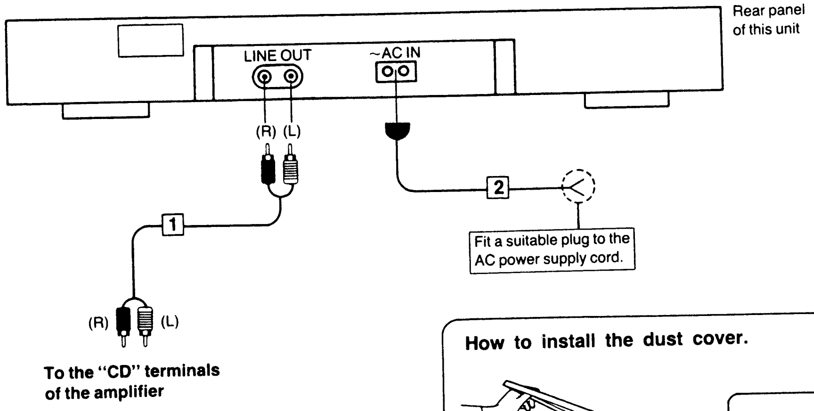
### ㉓ Program play indicator ( program )
Illuminates when the unit is in the programming or program play mode.

## Remote functions

Ⓡ On the remote control transmitter only.


Remote control signal transmission window
⑩ Pause button (❚❚ pause)
⑪ Stop button (■ stop)
⑨ Play button (▶ play)
⑫ Search buttons (◀◀ search ▶▶)
⑦ Skip buttons (⏮ skip ⏭)
Ⓡ Disc button (disc)
⑭ Program/continue button (program/continue)
Ⓡ Numeric buttons (1~9, 0, +10)
④ Time mode select button (time mode)
Ⓡ Clear button (clear)
③ Random button (random)
Ⓡ Recall button (recall)
⑬ Repeat button (repeat)
Technics
Remote Control Transmitter

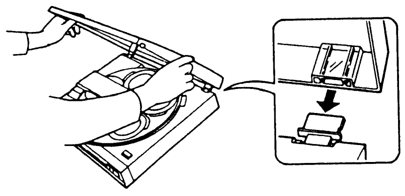
## ■ CONNECTIONS


Rear panel of this unit
LINE OUT
~AC IN
(R) (L)
1
2
Fit a suitable plug to the AC power supply cord.
(R) (L)
To the "CD" terminals of the amplifier

1 **Stereo connection cable** (included)

2 **AC power supply cord** (included)

**How to install the dust cover.**

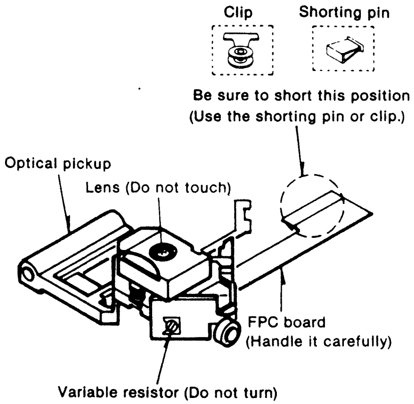


## ■ HANDLING PRECAUTIONS FOR OPTICAL PICKUP

The laser diode in the optical pickup may break down due to potential difference caused by static electricity of clothes or human body.
So, be careful of electrostatic breakdown during repair of the optical pickup.

### • Handling of optical pickup

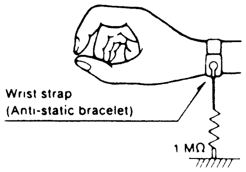
1. Do not subject the optical pickup to static electricity as it is extremely sensitive to electrical shock.
2. To prevent the breakdown of the laser diode, an anti-static shorting pin is inserted into the flexible board. (FPC board)
   When removing or connecting the short pin, finish the job in as short time as possible.
3. Take care not to apply excessive stress to the flexible board. (FPC board)
4. Do not turn the variable resistor (laser power adjustment). It has already been adjusted.

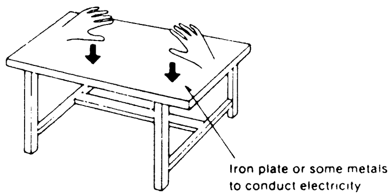

Clip
Shorting pin
Be sure to short this position
(Use the shorting pin or clip.)
Optical pickup
Lens (Do not touch)
FPC board
(Handle it carefully)
Variable resistor (Do not turn)

### • Grounding for electrostatic breakdown prevention

1. Human body grounding
   Use the anti-static wrist strap to discharge the static electricity from your body.
2. Work table grounding
   Put a conductive material (sheet) or steel sheet on the area where the optical pickup is placed, and ground the sheet.

**Caution:**
The static electricity of your clothes will not be grounded through the wrist strap. So, take care not to let your clothes touch the optical pickup.


Wrist strap
(Anti-static bracelet)
1 MΩ

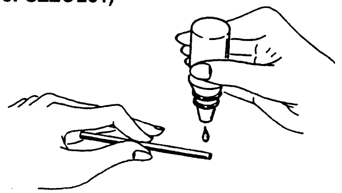

Iron plate or some metals to conduct electricity

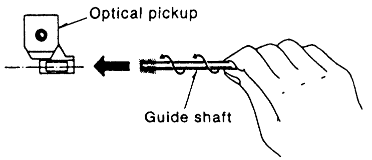
## ■ INSTRUCTIONS FOR TRAVERSE OIL (Part No. SZZOL31)

The container contains 6g (approx. 3ml) of oil.
One application (one shaft) uses 0.05ml of oil.

**How to Use**

(1) Remove the guide shaft in the traverse deck from the optical pickup and clean off any dust from the guide shaft.
(2) Apply one drop of the SZZOL31 to the tip of the guide shaft.
(3) Hold the guide shaft so that its oiled end touches the optical pickup and insert it into the bearing while rotating it slowly.
(4) After securing the guide shaft, move the optical pickup by hand several times to the left and right to distribute the oil on the guide shaft.




Optical pickup
Guide shaft

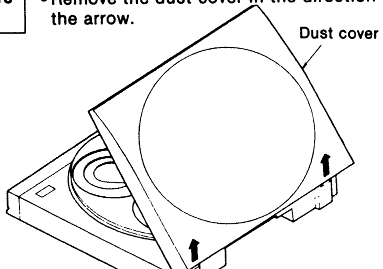
# ■ DISASSEMBLY INSTRUCTIONS

**Warning:** This product uses a laser diodes. Refer to caution statements on page 2.

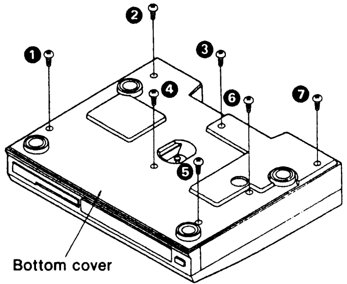
**ACHTUNG:**
- Die lasereinheit nicht zerlegen.
- Die lasereinheit darf nur gegen eine vom hersteller spezifizierte einheit ausgetauscht werden.

*** This CD player is equipped with FPC boards, so handle them with care during disassembly and reassembly.**

| Ref. No.<br>1 | Removal of the dust cover |
|---|---|
| Procedure<br>1 | • Remove the dust cover in the direction of the arrow. |



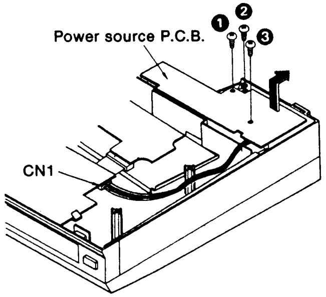
| Ref. No.<br>2 | Removal of the bottom cover |
|---|---|
| Procedure<br>2 | • Remove the 7 screws (❶~❼). |

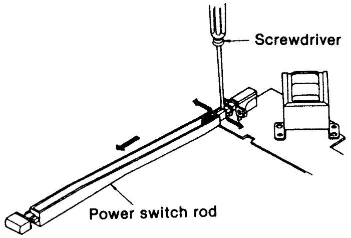

❶
❷
❸
❹
❺
❻
❼
Bottom cover

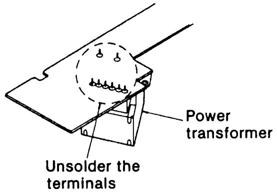
| Ref. No.<br>3 | Removal of the power source P.C.B., power transformer and power switch rod |
|---|---|
| Procedure<br>2→3 | |

1. Remove the 3 screws (❶~❸).
2. Remove the 1 connector (CN1).
3. Remove the power source P.C.B. in the direction of the arrow.
4. Remove the power switch rod by using a screwdriver.
5. Unsolder the terminals of the power transformer.

**Note:** Set the power switch to the "OFF" position.


Power source P.C.B.
❶
❷
❸
CN1

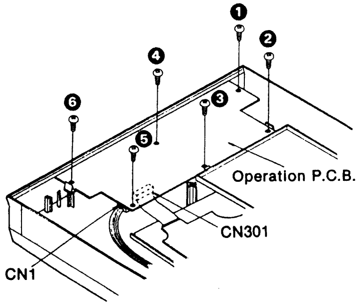

Screwdriver
Power switch rod


Power transformer
Unsolder the terminals

| Ref. No.<br>4 | Removal of the operation P.C.B. |
|---|---|
| Procedure<br>2→4 | |

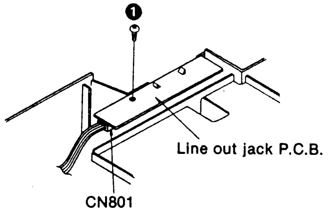
**■ Removal of the operation P.C.B.**

1. Remove the 6 screws (❶~❻).
2. Remove the 2 connectors (CN1, CN301).


❶
❷
❸
❹
❺
❻
Operation P.C.B.
CN301
CN1

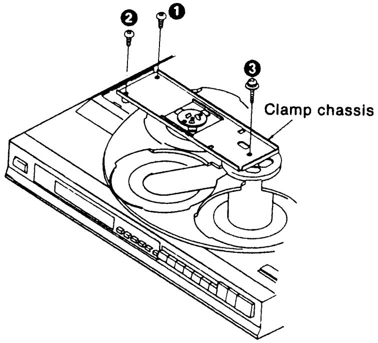
| Ref. No.<br>5 | Removal of the line out jack P.C.B. |
|---|---|
| Procedure<br>2→5 | |

1. Remove the 1 screw (❶).
2. Remove the 1 connector (CN801).


❶
Line out jack P.C.B.
CN801

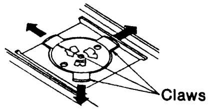
| Ref. No.<br>7 | Removal of the clamp chassis |
|---|---|
| Procedure<br>1→2→6→7 | |

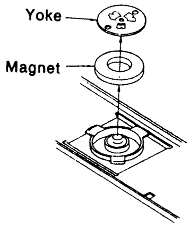
1. Remove the 3 screws (❶~❸).


❷
❶
❸
Clamp chassis

| Ref. No.<br>9 | Removal of the magnet |
|---|---|
| Procedure<br>1→2→6<br>→7→9 | |

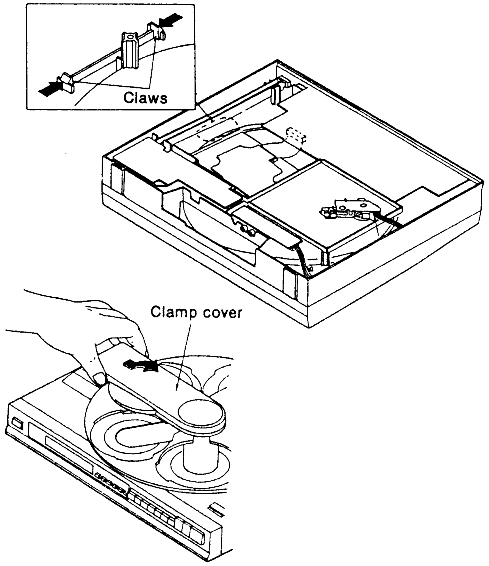
• Release the 3 claws.




Yoke
Magnet

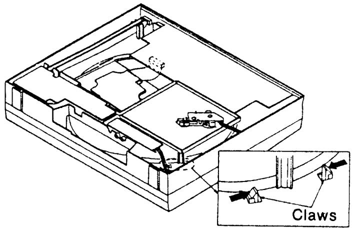
| Ref. No.<br>6 | Removal of the clamp cover |
|---|---|
| Procedure<br>1→2→6 | |

1. Release the 2 claws.
2. Remove the clamp cover in the direction of the arrow.

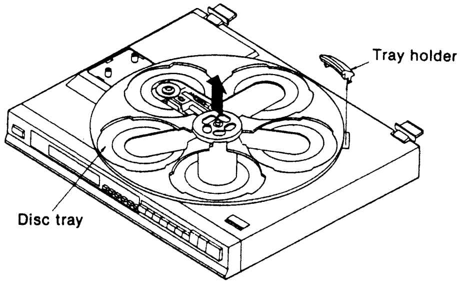

Claws
Clamp cover

| Ref. No.<br>8 | Removal of the disc tray |
|---|---|
| Procedure<br>1→2→6<br>→7→8 | |

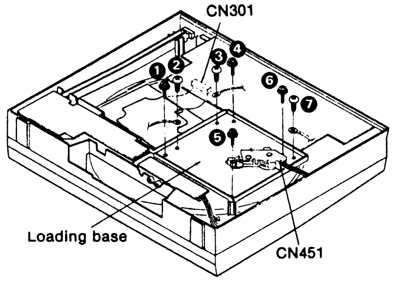
1. Release the 2 claws of the tray holder.



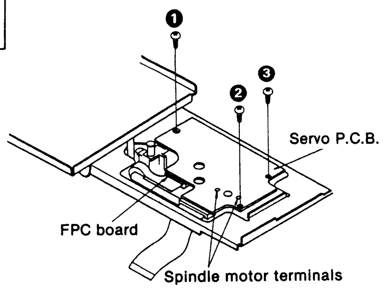
2. Remove the disc tray in the direction of the arrow.


Tray holder
Disc tray

| Ref. No. 10 | Removal of the loading chassis |
|---|---|
| Procedure<br>8→10 | 1. Remove the 7 screws (❶~❼).<br>2. Remove the 2 connectors (CN301, CN451). |


CN301
❶
❷
❸
❹
❺
❻
❼
Loading base
CN451

| Ref. No. 11 | Removal of the servo P.C.B. |
|---|---|
| Procedure<br>8→10→11 | |

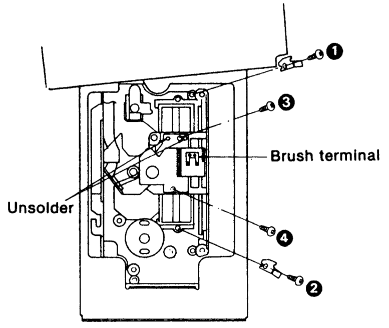

❶
❷
❸
Servo P.C.B.
FPC board
Spindle motor terminals

1. Remove the 3 screws (❶~❸).
2. Unsolder the 2 terminals of spindle motor.
3. Remove the FPC board from the optical pickup.

**Caution:** To prevent the breakdown of the laser diode, antistatic shorting pin is inserted into the FPC board.

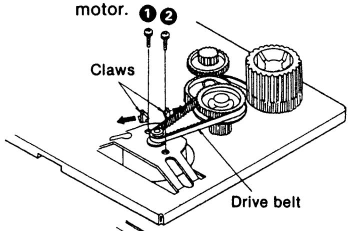
| Ref. No. 12 | Removal of the optical pickup |
|---|---|
| Procedure<br>8→10→12 | **Refer to the handling precautions for optical pickup and instructions for traverse oil (See page 6).** |

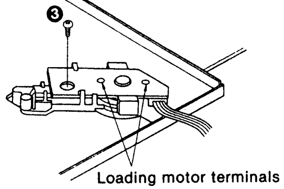
1. Remove the 2 screws (❶, ❷).
2. Unsolder the 2 terminals and the 2 screws (❸, ❹).


❶
❸
Brush terminal
Unsolder
❹
❷

**Caution:** Take care not to touch the brush terminal.

| Ref. No. 13 | Removal of the loading motor |
|---|---|
| Procedure<br>8→10→13 | 1. Remove the drive belt.<br>2. Remove the 3 screws (❶~❸).<br>3. Release the 2 claws.<br>4. Unsolder the 2 terminals of the loading motor. |

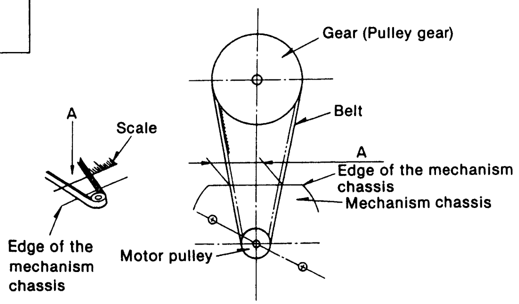

❶
❷
Claws
Drive belt


❸
Loading motor terminals

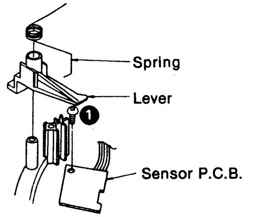
**Belt tension adjustment procedure**

1. Attach the belt to the pulley gear and the motor pulley, and temporarily secure the motor.
2. Secure the motor firmly so that, while there is no force being applied to the belt, dimension A of the edge of the mechanism chassis is within the standard value.

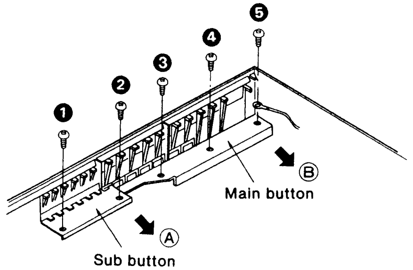
**Standard value: A=16±0.5mm**


A
Scale
Edge of the mechanism chassis
Gear (Pulley gear)
Belt
A
Edge of the mechanism chassis
Mechanism chassis
Motor pulley

| Ref. No. 14 | Removal of the sensor P.C.B. |
|---|---|
| Procedure<br>2→5→14 | 1. Remove the spring and lever.<br>2. Remove the 1 screw (❶). |


Spring
Lever
❶
Sensor P.C.B.

| Ref. No. 15 | Removal of the sub button and main button |
|---|---|
| Procedure<br>2→4→15 | 1. Remove the 2 screws (❶, ❷).<br>2. Remove the sub button in the direction of the arrow Ⓐ.<br>3. Remove the 3 screws (❸~❺).<br>4. Remove the main button in the direction of the arrow Ⓑ. |


❺
❹
❸
❷
❶
Ⓑ
Main button
Ⓐ
Sub button

| Ref. No. 16 | Removal of the spindle motor |
|---|---|
| Procedure<br>8→10→12<br>→16 | |

1. Loosen the screw (❶) by using a 1.27mm allen wrench and remove the turntable.
2. Remove the 2 screws (❷, ❸).

**Caution:**

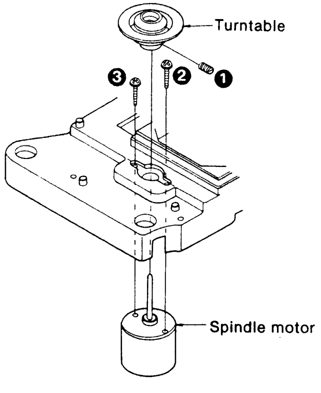
1. Turntable height adjustment is necessary any time the turntable or spindle motor is replaced.
2. The (+) terminal of the spindle motor is indicated by the red mark.

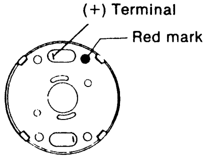
**Adjustment of turntable height**

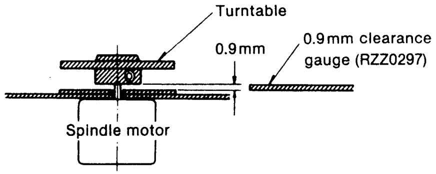
1. Insert a 0.9mm clearance gauge (RZZ0297) between the turntable and loading base as shown in the figure.
2. Tighten the turntable set-screw by using a 1.27mm allen wrench.

**Caution:**

Refer to turntable height adjustment (See page 12).


Turntable
❸
❷
❶
Spindle motor


(+) Terminal
Red mark

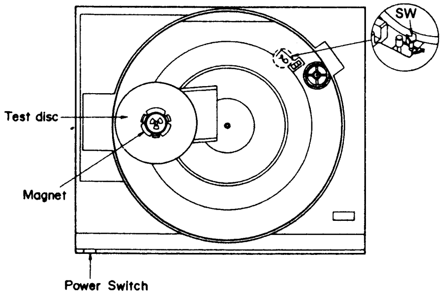

Turntable
0.9mm
0.9mm clearance gauge (RZZ0297)
Spindle motor

# MEASUREMENTS AND ADJUSTMENTS

**Warning:** This product uses a laser diode. Refer to caution statements on page 2.

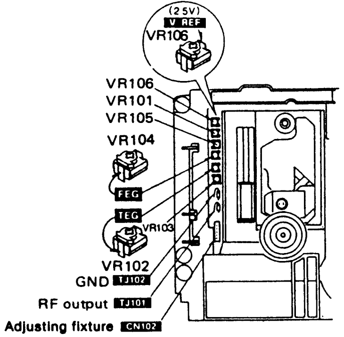
## PREPARTION

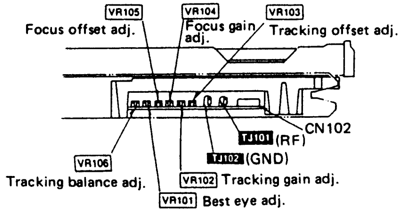
1. Remove the dust cover (refer to disassembly instruction Ref. No. 1).
2. Remove the bottom cover (refer to disassembly instruction Ref. No. 2).
3. Remove the clamp cover (refer to disassembly instruction Ref. No. 6).
4. Remove the clamp chassis (refer to disassembly instruction Ref. No. 7).
   Set the power switch to ON.
5. (1) The carousel rotates clockwise and stops at the fifth tray.
   (2) Set the power switch to OFF and then to ON again, when the optical deck reaches it's height position, set the power switch to OFF.
6. Remove the disc tray (refer to disassembly instruction Ref. No. 8).
7. Place the test disc and secure it by using the magnet (refer to disassembly instruction Ref. No. 9).
8. Set the unit in the test mode as follows:
   (hold the play, stop and disc 1 keys (3 keys) on and set the power switch to ON.
9. Follow the adjustment procedure.


SW
Test disc
Magnet
Power Switch

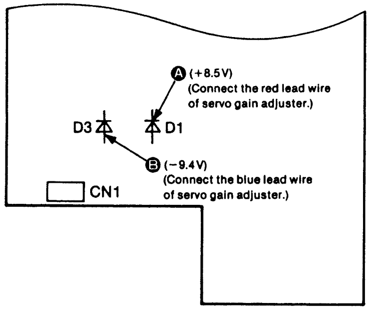
## ADJUSTMENT POINTS

- **Servo P.C.B.**

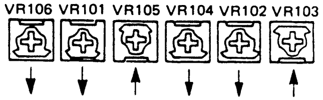

(2.5V)
V. REF
VR106
VR106
VR101
VR105
VR104
FEG
TEG
VR103
VR102
GND TJ102
RF output TJ101
Adjusting fixture CN102


VR105
Focus offset adj.
VR104
Focus gain adj.
VR103
Tracking offset adj.
CN102
TJ101 (RF)
TJ102 (GND)
VR106
Tracking balance adj.
VR102 Tracking gain adj.
VR101 Best eye adj.

- **Main P.C.B.**


Ⓐ (+8.5V)
(Connect the red lead wire of servo gain adjuster.)
D3
D1
Ⓑ (−9.4V)
(Connect the blue lead wire of servo gain adjuster.)
CN1

- **Temporary setting of each VR**


VR106
VR101
VR105
VR104
VR102
VR103

Temporary VR setting if any of the trimmer VRs are replaced or require readjustment, temporarily set them to the following positions:

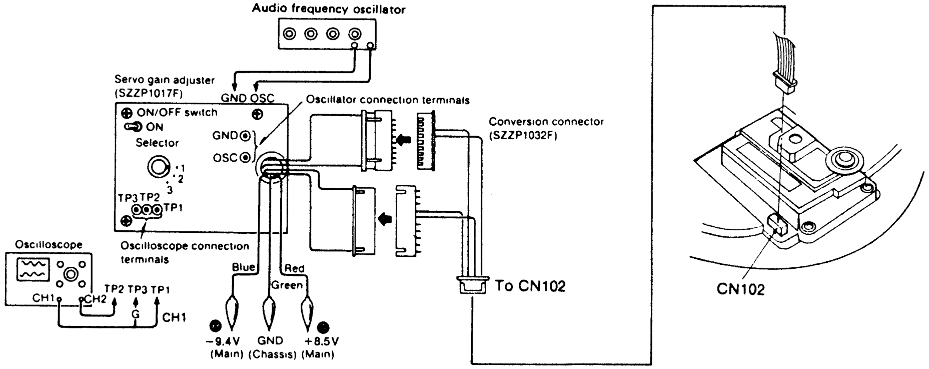
**Measuring Instruments and Special Tools**

- ∗ Servo gain adjuster (SZZP1017F)
- ∗ Test discs
  1. Playability test disc (SZZP1054C or SZZP1014F)
  2. Uneven test disc (SZZP1056C)
  3. Black band test disc (SZZP1057C)
- ∗ Normal disc
- ∗ Dual-beam oscilloscope with bandwidth of 30 MHz or better (with EXT trigger and 1 : 1 probe).
- ∗ Audio frequency (AF) osillator
- ∗ Comversion connector (SZZP1032F)
- ∗ Allen wrench (M2.0) (SZZP1101C)
- ∗ Allen wrench (M1.27)
- ∗ 0.9mm clearance gauge (RZZ0297)

**Perform adjustments depend on the part to be replaced according to followings:**

(1) Spindle motor ........................................... Items 1, 3 to 8
(2) Turntable ................................................. Items 1, 3 to 8
(3) Optical pickup.......................................... Items 2 to 8

**Connection of servo gain adjuster**


Audio frequency oscillator
Servo gain adjuster
(SZZP1017F)
GND OSC
Oscillator connection terminals
ON/OFF switch
ON
Selector
GND
OSC
1
2
3
TP3 TP2
TP1
Oscilloscope
Oscilloscope connection terminals
Conversion connector
(SZZP1032F)
Blue
Red
Green
TP2 TP3 TP1
CH1
CH2
G
CH1
−9.4V (Main)
GND (Chassis)
+8.5V (Main)
To CN102
CN102

(See page 11.)

**Adjusting Procedure**

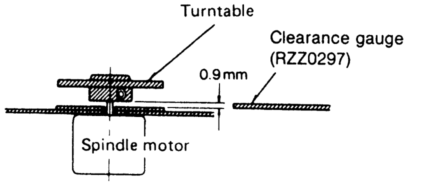
∗ If you have replaced the optical pickup, spindle motor, or turntable, do the following adjustment:

### (1) TURNTABLE HEIGHT ADJUSTMENT

1. Insert the 0.9 mm clearance gauge (RZZ0297) between the turntable and the loading base (see the figure at right).
2. Tighten the turntable retention screw with the 1.27 mm allen wrench.
3. Connect the oscilloscope's CH. 1 probe across VR104's **FEG** (+) and VR106's **V. REF** (−) terminals. filter.
   (Note: A voltage of 2.5V appears at the V. REF terminal. Take care not to short the player's chassis to the oscilloscope ground.)
   **Oscilloscope setting:** VOLT .......... 50 mV
   SWEEP ......... 1 ms.
   Input coupling ... DC
4. Adjust oscilloscope's DC zero balance.
5. Switch the player power **ON**, and play the test disc (SZZP1014F or SZZP1054C).
6. Measure the voltage amplitude of the signal on the oscilloscope.

Note 1. If the measured amplitude is within a range of +/− 15 mV, the turntable height is correct. If it is outside this range, adjust the turntable height by using the clearance gauge as a pry.

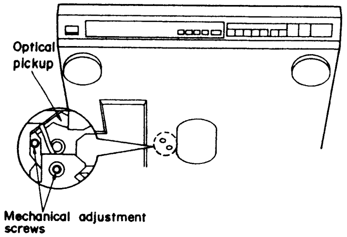
If the amplitude exceeds +15 mV, lower turntable.
If the amplitude is below −15 mV, elevate the turntable.

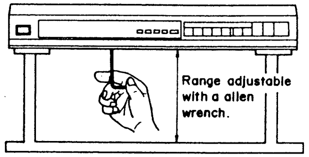

Turntable
Clearance gauge
(RZZ0297)
0.9mm
Spindle motor

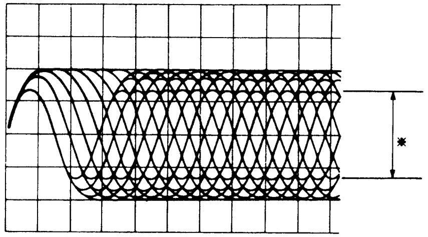
Note 2. If the measured amplitude greatly surpasses or falls short of the range above, set VR105 at or around the center, then try to adjust the height again. (Then be sure to adjust the focus offset as well.)

### (2) MECHANICAL ADJUSTMENT

1. Connect the oscilloscope's CH. 1 probe across **TJ101** (+) and **TJ102** (–) on the Servo P.C.B.
   **Oscilloscope setting:** VOLT . . . . . . . . . . 100 mV
   SWEEP . . . . . . . . . 0.5 µs.
   Input coupling . . . AC
2. Switch the player power **ON**, and play track **9** on the test disc (SZZP1056C). (Playing any other track may yield a false adjustment.)
3. Leave the player in Play mode, and place it as shown in the figure on the right.
4. Alternately adjust the two mechanical adjusting screws with the 2.0mm allen wrench (SZZP1101C) until the vertical fluctuation of RF signal is minimized and the eye pattern is most stretched.
5. After completing the adjustment, lock the **mechanical adjustments** with lock paint (RZZOL01).



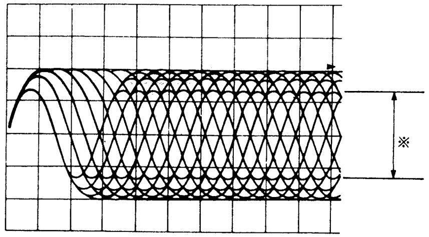




⁎ Most stretched eye pattern.

### (3) BEST EYE (PD BALANCE) ADJUSTMENT

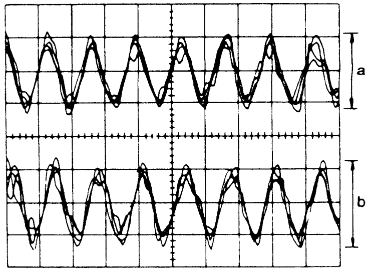
1. Connect the oscilloscope's CH. 1 probe across **TJ101** (+) and **TJ102** (–) on the Servo P.C.B.
   **Oscilloscope setting:** VOLT . . . . . . . . . . 100 mV
   SWEEP . . . . . . . . . 0.5 µ s
   Input coupling . . . AC
2. Switch the player power **ON**, and play the 0.5 mm black dot on the test disc (SZZP1014F or SZZP1054C).
3. Adjust **VR101** until the vertical fluctuation of RF signal is minimized and the eye pattern is most stretched.



⁎ Most stretched eye pattern.

### (4) FOCUS GAIN ADJUSTMENT

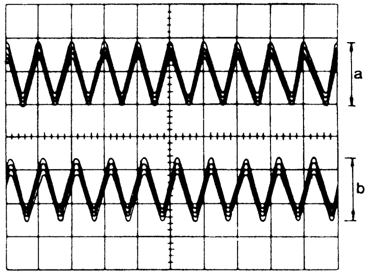
1. Connect the servo gain adjuster to the player (see page 15).
2. Set the servo gain adjuster's gain switch to position "2" and the ON/OFF switch to ON.
3. Set up the AF oscillator output for **825Hz, 150 mVp-p,** and connect it across the OSC and GND terminals on the servo gain adjuster.
4. Connect oscilloscope's CH. 1 and CH. 2 probes to the servo gain adjuster's TP1 and TP2 terminals, respectively (TP3 is GND).
   **Oscilloscope setting:** VOLT . . . . . . . . . . 100 mV (both channels)
   SWEEP . . . . . . . . . 0.2 ms.
   Input coupling . . . AC
5. Play the test disc (SZZP1014F or SZZP1054C).
6. Set the servo gain adjuster's gain switch to position "3", and you will see a 825 Hz signal on the oscilloscope. Adjust **VR104** until the signal amplitudes on both channels become identical to each other.
7. Set the gain switch back to position "2".



※ Adjust **VR104** until a equals b.

### (5) TRACKING GAIN ADJUSTMENT

1. Set up the AF oscillator output for **1.1 kHz, 150 mVp-p,** and connect it across the OSC and GND terminals on the servo gain adjuster.
2. Connect oscilloscope's CH. 1 and CH. 2 probes to the servo gain adjuster's TP1 and TP2 terminals, respectively (TP3 is GND).
   **Oscilloscope setting:** VOLT . . . . . . . . . . 100 mV (both channels)
   SWEEP . . . . . . . . . 0.2 ms.
   Input coupling . . . AC
3. Switch the player power **ON**, and play the test disc (SZZP1014F or SZZP1054C).
4. Set the servo gain adjuster's gain switch to position "1", and you will see a 1.1 kHz signal on the oscilloscope. Adjust **VR102** until the signal amplitudes on both channels become identical to each other.
5. Set the gain switch back to position "2".

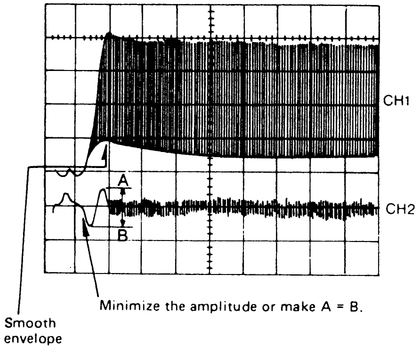


※ Adjust **VR102** until a equals b.

### (6) FOCUS OFFSET ADJUSTMENT

Note: Make sure that the servo gain adjuster's gain switch is set to position "2".

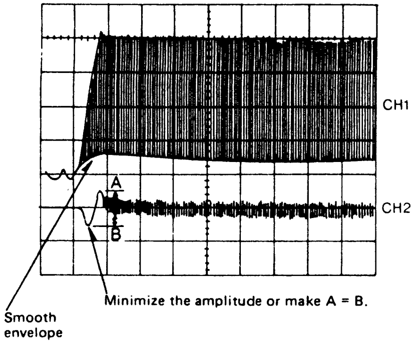
1. Connect the oscilloscope's CH. 1 probe across **TJ101** (+) and **TJ102** (–) on the Servo P.C.B. and its CH. 2 probe (+) to VR104's **FEG** terminal.
   **Oscilloscope setting:** VOLT. . . . . . . . . .100 mV (CH. 1)
   100 mV (CH. 2)
   SWEEP. . . . . . . . .0.2 ms.
   Input coupling. . . AC (both CH. 1 and 2)
   Trigger mode . . . .NORM (trigger CH. 1.)
2. Switch the player power **ON**, and play track **9** on the test disc (SZZP1057C).
3. Trigger the oscilloscope's CH. 1 so that the following waveforms are observed. Adjust **VR105** until the dip in the RF signal envelope on CH. 1 is smooth and the signal amplitude on CH. 2 is minimized, i.e. when amplitude A equals amplitude B.



### (7) TRACKING OFFSET ADJUSTMENT

Note: Make sure that the servo gain adjuster's gain switch is set to position "2".

1. Connect the oscilloscope's CH. 1 probe across **TJ101** (+) and **TJ102** (−) on the Servo P.C.B., and its CH. 2 probe (+) to VR102's **TEG** terminal.
   **Oscilloscope setting:** VOLT.........100 mV (CH. 1)
   100 mV (CH. 2)
   SWEEP........0.2 ms.
   Input coupling. . AC (both CH. 1 and 2)
   Trigger mode. . . NORM (trigger CH. 1.)
2. Switch the player power **ON**, and play track **9** on the test disc (SZZP1057C).
3. Trigger the oscilloscope's CH. 1 so that the following waveforms are observed. Adjust **VR103** until the dip in the RF signal envelope on CH. 1 is smooth and the signal amplitude on CH. 2 is minimized, i.e. when amplitude A equals amplitude B.

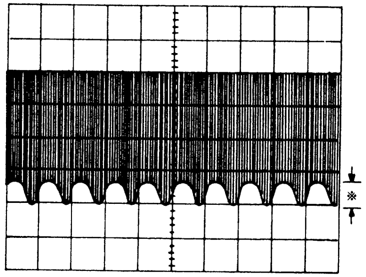


Smooth envelope

Minimize the amplitude or make A = B.

### (8) TRACKING BALANCE ADJUSTMENT

1. Make sure that the servo gain adjuster's gain switch is set to position "2".
2. Set up the AF oscillator output for **1.1 kHz, 600 mVp-p**, and connect it across the OSC and GND terminals on the servo gain adjuster.
3. Connect the oscilloscope's CH. 1 probe across **TJ101** (+) and **TJ102** (−) on the Servo P.C.B. and CH. 2 probe (+) to the OSC terminal on the servo gain adjuster.
   **Oscilloscope setting:** VOLT.........100 mV (CH. 1)
   200 mV (CH. 2)
   SWEEP........0.1 ms.
   Input coupling. .AC (both CH. 1 and 2)
   Trigger mode . . .NORM (trigger CH. 2)
4. Switch the player power **ON**, and play the test disc (SZZP1014F or SZZP1054C).
5. Set the servo gain adjuster's gain switch to position "1", and adjust **VR106** so that the section of the output of the waveform marked with ⁎ is balanced.
6. Disconnect the servo gain adjuster's leads from the player.



⁎ This section of the waveforn must be balanced.

### (9) CHECK OF PLAY OPERATION AFTER ADJUSTMENT

- **Checking Skip Search**

1. Play an ordinary musical program disc.
2. Press the skip button to check for normal skip search operation (in both the forward and reverse directions).

- **Checking Manual Search**

1. Play an ordinary musical program disc.
2. Press the manual search button to check for smooth manual search operations at either low or high speed (in both the forward and reverse directions).

- **Checking Using Defect Disc**

1. Play the 0.7 mm black dot and the 0.7 mm wedge on the defect test disc (SZZP1054C) and verify that no sound skip or noise occurs.
2. Play the middle tracks of the uneven test disc and verify that no sound skip or noise occurs.

## ■ TERMINAL FUNCTION OF IC'S

- IC101 (AN8373S): Servo amp.

| Pin No. | Mark | I/O Division | Function |
|---|---|---|---|
| 1 | AMP1 | I | RF signal input (X30 amp.) |
| 2 | PDAD | I | Photo detector current input (A2) |
| 3 | PDA | I | Photo detector current input (A1) |
| 4 | PDBD | I | Photo detector current input (A4) |
| 5 | PDB | I | Photo detector current input (A3) |
| 6 | LPD | I | Non-inverting laser power input |
| 7 | LD | O | Laser power auto control output |
| 8 | FBL1 | I | PD balance adjustment |
| 9 | FBL2 | I | |
| 10 | TBL1 | I | Tracking balance adjustment |
| 11 | TBL2 | I | |
| 12 | FOOFS | I | Focus offset adjustment |
| 13 | IVA | O | Current/voltage conversion output (A) |
| 14 | IVB | O | Current/voltage conversion output (B) |
| 15 | FE | O | Focus gain adjustment output |
| 16 | FPI | I | Focus error signal input |
| 17 | TPI | I | Tracking error signal input |
| 18 | C. TPL | I | Tracking error filter capacitor input |
| 19 | C. TPH | | |
| 20 | C. FPL | I | Focus error filter capacitor input |
| 21 | C. FPH | | |
| 22 | TPO | O | Tracking error signal output |
| 23 | FPO | O | Focus error signal output |
| 24 | FGC | I | Focus gain up signal input<br>(Not used, connected to GND) |
| 25 | TGC | I | Tracking gain up signal input<br>(Not used, connected to GND) |
| 26 | GD | I | Focus/Tracking down signal input<br>(Not used, connected to GND) |
| 27 | PTO | O | Position detecting amp. output |
| 28 | PTI | I | Position detecting amp. input |
| 29 | PBO | O | Position detecting buffer output |
| 30 | POT | I | Position detecting buffer input |
| 31 | BDO | O | Dropout detection output |
| 32 | $\overline{\text{RFDET}}$ | O | RF detection signal output |
| 33 | SDO | O | Dropout detection pulse output |
| 34 | C. SBDO | I | Dropout detecting capacitor input |
| 35 | ARF | O | RF signal output |
| 36 | C. AGC | I | AGC detecting capacitor input |
| 37 | VCC | I | Power supply (+5 V input) |
| 38 | LDON | I | Laser power control input |
| 39 | RF IN | I | RF signal input |
| 40 | AMPO | O | RF signal output |
| 41 | VREF | O | Reference voltage output |
| 42 | GND | I | Ground terminal |

## • IC102 (AN8374S): Servo processor

| Pin No. | Mark | I/O Division | Function |
|---|---|---|---|
| 1 | LSA | I | Phase difference input (A) |
| 2 | LSB | I | Phase difference input (B) |
| 3 | TEOFS | O | Tracking offset adjustment |
| 4 | TE | O | Tracking gain adjustment |
| 5 | TEG | I | |
| 6 | TE OUT | O | Tracking error signal output |
| 7 | TE BPF | I | Tracking error gain detecting filter (Not used, open) |
| 8 | FEG | I | Focus gain adjustment |
| 9 | FE OUT | O | Focus error signal output |
| 10 | CLW | O | Triangular wave oscillator capacitor output |
| 11 | VREF | I | Reference voltage input |
| 12 | ARF | I | RF signal input |
| 13 | CDSL | I | Data slice filter capacitor input |
| 14 | FPC | I | Frequency difference signal input |
| 15 | GND | I | Ground terminal |
| 16 | C. PLL | I | PLL loop filter constant |
| 17 | VSS | I | Ground terminal |
| 18 | CLK | I | Frequency pull-in clock signal (88.2 kHz) input |
| 19 | SRF | O | Sliced and digitized RF signal output |
| 20 | PCK | O | Clock output extracted from SRF |
| 21 | EFM | O | EFM signal output synchronous with PCK |
| 22 | VDD | I | Power supply (+5 V input) |
| 23 | SPCNT | O | Track crossing speed control output output (Not used, open) |
| 24 | SENSE | O | Selector output (track crossing state) |
| 25 | TRV | O | Traverse servo control output |
| 26 | $\overline{\text{FLOCK}}$ | O | Focus lock signal output |
| 27 | KICK | O | Track kick signal output |
| 28 | LDON | O | Laser power control output |
| 29 | VDET | O | Focus/tracking gain up output (Not used, open) |
| 30 | CNT1 | I | Control input (FOON: Focus Servo On signal) |
| 31 | CNT2 | I | Control input (TRON: Tracking Servo On signal) |
| 32 | CNT3 | I | Control input (KICKF: Kick Direction (Forward) command) |
| 33 | CNT4 | I | Control input (KICKR: KICK Direction (Backward) command) |
| 34 | TRVF | I | Traverse forward command signal |
| 35 | TRVR | I | Traverse backward command signal |
| 36 | $\overline{\text{RFDET}}$ | I | RF detection signal input |
| 37 | BDO | I | Dropout detection input |
| 38 | VCC | I | Power supply (+5 V input) |
| 39 | TVPO | O | Traverse position detecting resistor/capacitor inputs |
| 40 | TVPI | I | |
| 41 | BROUT | O | Tracking drive control output |
| 42 | BRIN | I | Tracking error signal input |

## • IC103 (AN8377N): BTL drive

| Pin No. | Mark | I/O Division | Function |
|---|---|---|---|
| 1 | PVCC | I | Driver power supply (+7.7V input) |
| 2 | VCC | I | Power supply (+7.7V input) |
| 3 | TB | O | External transistor base driving output |
| 4 | VMON | O | Voltage (+4.9V) output |
| 5 | TVDI | I | Traverse error signal input |
| 6 | FDI | I | Focus error signal input |
| 7 | TDI | I | Tracking error signal input |
| 8 | VREF | I | Reference voltage input |
| 9 | TD– | O | Inverting output of tracking driver |
| 10 | TD+ | O | Non-inverting output of tracking driver |
| 11 | FD– | O | Inverting output of focus driver |
| 12 | FD+ | O | Non-inverting output of focus driver |
| 13 | TVD– | O | Inverting output of traverse driver |
| 14 | TVD+ | O | Non-inverting output of traverse driver |
| 15 | $\overline{\text{RESET}}$ | O | Reset signal output |
| 16 | PC | I | PC input (connect to GND.) |

## • IC301 (MN6625): Digital signal processing

| Pin No. | Mark | I/O Division | Function |
|---|---|---|---|
| 1 | BYTCK | O | Serial data byte clock<br>(Not used, open) |
| 2 | FCLK | O | Crystal frame clock<br>(Not used, open) |
| 3 | DEMPH | O | De-emphasis ON signal<br>(de-emphasis ON at "H") |
| 4 | SRDATA | O | Serial data output (MSB first) |
| 5 | SCK | O | Serial bit clock output |
| 6 | LRCK | O | LR discrimination signal output |
| 7 | WDCK | O | Serial data output word clock |
| 8 | LDG | O | L channel deglitch signal<br>(Not used, open) |
| 9 | RDG | O | R channel deglitch signal<br>(Not used, open) |
| 10 | IPFLAG | O | Interpolation flag<br>(interpolation at "H") |
| 11 | FLAG | O | Error flag terminal |
| 12 | XCK | O | Clock (16.9344MHz) output |
| 13 | TEST | I | Test mode selection<br>(Not used, connected to +5V) |
| 14 | TX | O | Digital signal output<br>(Not used, open) |
| 15 | SLEEP | I | Mode selector<br>("L": normal, "H": SLEEP mode) |
| 16 | CSEL | I | Test terminal ("L": normal) |
| 17 | X1 | I | Clock input (16.9344MHz) |
| 18 | X2 | O | Clock output (16.9344MHz) |
| 19 | VSS | I | GND terminal |
| 20 | BLKCK | O | Sub-code block (Q data)<br>clock (75Hz) |
| 21 | $\overline{\text{CLDCK}}$ | O | Sub-code frame (Q data)<br>clock (7.35kHz) |
| 22 | $\overline{\text{SUBQ}}$ | O | Sub-code (Q data) output |
| 23 | $\overline{\text{RST}}$ | I | Reset signal input (reset at "L") |
| 24 | MLD | I | Command load signal input |
| 25 | MCLK | I | Command clock signal input |
| 26 | MDATA | I | Command data input |
| 27 | DMUTE | I | Muting control |
| 28 | $\overline{\text{TRON}}$ | I | Tracking servo ON signal<br>(tracking servo ON at "L") |
| 29 | STAT | O | Processing condition<br>(CRC, CUE, CLVS, TT STOP, FCLV) |
| 30 | SUBC | O | Sub-code serial output data<br>(Not used, open) |
| 31 | SBCK | I | Clock for sub-code serial output<br>(Not used, open) |
| 32 | SMCK | O | Clock output (4.2336MHz) |
| 33 | VDD | I | Power supply (connected to +5V) |
| 34 | MEMP | I | Emphasis signal input<br>(Not used, open) |
| 35 | FG | I | Spindle motor FG signal input<br>(Not used, open) |
| 36 | PC | O | Spindle motor ON signal<br>(ON at "L") |
| 37 | EC | O | Spindle motor drive signal |
| 38 | RESY | O | Resynchronizing signal<br>(Not used, open) |
| 39 | DO | I | Drop-out signal (Drop-out at "H") |
| 40 | SRF | I | EFM signal input (DSL) |
| 41 | EFM | I | EFM signal input (PLL) |
| 42 | PCK | I | PLL extract clock input<br>(4.3218MHz) |
| 43 | FPC | O | PLL frequency comparision signal |
| 44<br>∫<br>51 | D7<br>∫<br>D0 | I/O | 16K RAM data input/output |
| 52 | RAM/OE | O | 16K RAM $\overline{\text{OE}}$ signal |
| 53 | RAM/WE | O | 16K RAM $\overline{\text{WE}}$ signal |
| 54<br>∫<br>64 | RAM/A0<br>∫<br>RAM/A10 | O | 16K RAM address signal<br>(RAMA0: LSB, RAMA10: MSB) |

## • IC401 (MN15283PJL): System control

| Pin No. | Mark | I/O | Function |
|---|---|---|---|
| 1 | GND | I | GND terminal |
| 2 | XO | O | Not used, open |
| 3 | X1 | I | Optical servo condition input |
| 4 | M-RLY | I | Muting control |
| 5 | MDATA | O | Command data output |
| 6 | MCLK | O | Command clock output |
| 7 | MLD | O | Command load output |
| 8 | SLOW | O | Motor drive control |
| 9 | FOW/REV | O | Motor drive control |
| 10 | LOADING | O | Motor drive control |
| 11 | HIGHT | O | Motor drive control |
| 12 | SYNC | I | Not used, open |
| 13 | RST | I | Reset signal input (reset at "L") |
| 14 | BLKCK | I | Sub-code block (Q-data) clock (75kHz) input |
| 15<br>~<br>18 | P50<br>~<br>P53 | I | Key scan input |
| 19 | CLDCK | I | Sub-code frame clock (7 35kHz) |
| 20 | SUBQ | I | Sub-code "Q" data input |
| 21 | NC | — | Not used, open |
| 22 | NC | — | Not used, open |
| 23 | TRV-R | O | Traverse reverse command signal |
| 24 | TRV-F | O | Traverse forward command signal |
| 25 | CONT4 | O | Optical servo IC control signal (KIKCR: Kick direction [Reverse] command) |
| 26 | CONT3 | O | Optical servo IC control signal (KICKF: Kick direction [Forward] command) |
| 27 | CONT2 | O | Optical servo IC control signal (TRON: Tracking servo) |
| 28 | CONT1 | O | Optical servo IC control signal (FOON: Focus servo) |
| 29 | STAT | I | Key input strobe and processing status input from signal processing LSI travers position detector |
| 30 | HIGHT | I | Elevator height signal input (Not used, open) |
| 31 | FLOCK | I | Optical servo condition (Focus) input |
| 32 | SENSE | I | Optical servo condition (Track cross) input |
| 33 | PAUSE | O | Not used, open |
| 34 | PLAY | O | Not used, open |
| 35 | DAC | O | Not used, open |
| 36 | VPP | I | FL drive power supply (connected to −28V) |
| 37<br>~<br>52 | DO<br>~<br>DF | O | FL glide signal and key scan signal |
| 53<br>~<br>61 | S8<br>~<br>S0 | O | FL anode signal |
| 62 | VDD | I | Power supply (connected to +5V) |
| 63 | OSC2 | I | Clock terminal (Not used, open) |
| 64 | OSC1 | I | Clock input |

## • IC403 (MN1550PEB): Remote control signal processing

| Pin No. | Mark | Singnal | I/O Devision | Function |
|---|---|---|---|---|
| 1 | VDD | —— | I | Power supply (connected to +5V) |
| 2 | OSC1 | SMCK | I | Clock input |
| 3 | OSC2 | —— | —— | Not used, open |
| 4 | P22 | —— | —— | Not used, open |
| 5 | RST | RESET | I | Reset signal input |
| 6 | P21 | —— | —— | Not used, open |
| 7 | P20 | —— | I | Remote control signal input |
| 8 | IRQ | —— | I | Program enable/de-enable control |
| 9 | P31 | SYNC | O | Not used, open |
| 10<br>~<br>13 | P10<br>~<br>P13 | Data | I | Key strobe |
| 14<br>~<br>17 | P00<br>~<br>P03 | Data | | |
| 18 | VSS | GND | I | GND terminal |

## • IC801 (SM5807ES): Digital filter

| Pin No. | Mark | I/O Division | Function |
|---|---|---|---|
| 1 | XT | I | Clock signal input (16.9344MHz) |
| 2 | $\overline{XT}$ | I | Clock signal input (Not used, open) |
| 3 | $\overline{CKSL}$ | I | External input terminal (Not used, open) |
| 4 | CKO | O | Clock signal output (Not used, open) |
| 5 | LRCI | I | Synchronizing clock signal input of 44.1kHz |
| 6 | DIN | I | Serial data input |
| 7 | BCKI | I | Serial bit clock input |
| 8 | $V_{SS}$ | I | GND terminal |
| 9 | $\overline{SCSL}$ | I | $\overline{SCSL}$=H: System clock=192fs<br>$\overline{SOSL}$=L: System clock=196fs<br>(fs=Sampling frequency)<br>(Not used, open) |
| 10 | DGR | O | Rch deglitch signal output (176.4kHz) (Not used, open) |
| 11 | DGL | O | Lch deglitch signal output (176.4kHz) (Not used, open) |
| 12 | DOUT | O | Serial data output |
| 13 | WDCO | O | Output control clock signal (352.8kHz) |
| 14 | $\overline{LRCO}$ | O | Output control clock signal (176.4kHz) |
| 15 | BCKO | O | Serial bit clock output (8.4672MHz or 8.6436MHz) |
| 16 | $V_{DD}$ | I | Power supply (connected to +5V) |

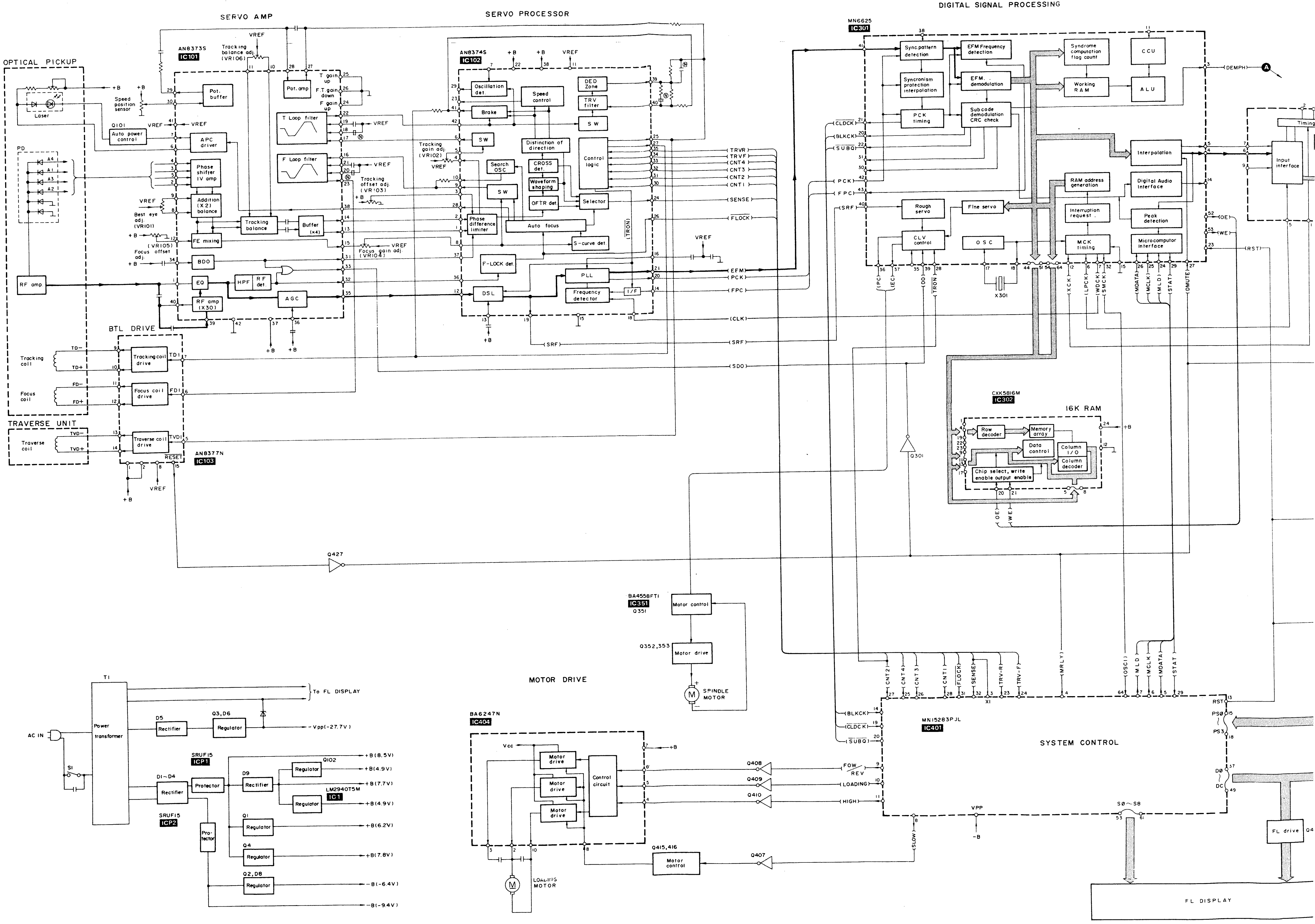
## • IC802 (LC7881B): D/A converter

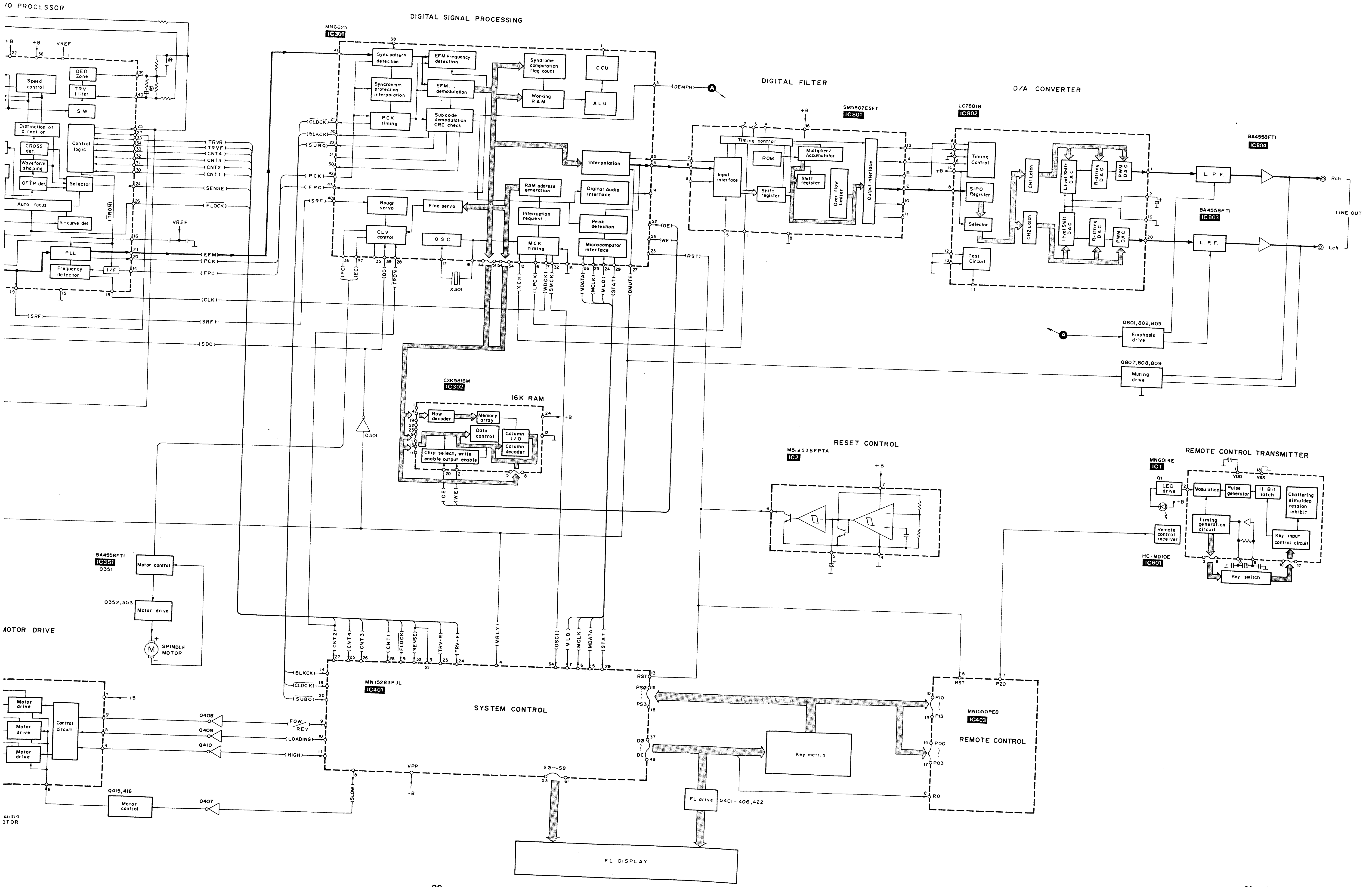
| Pin No. | Mark | I/O Division | Function |
|---|---|---|---|
| 1 | CH1 OUT | O | CH1 (Rch) data output |
| 2 | VREF H1 | I | Reference voltage input terminal (1) |
| 3 | VREF H2 | I | Reference voltage input terminal (2) (Not used, connected to +5V) |
| 4 | $V_{DD}$ | I | Power supply (connected to +5V) |
| 5 | WCLK 2 | I | Word clock (2) input terminal (Not used, connected to GND) |
| 6 | LRCK | I | LR clock input terminal |
| 7 | WCLK 1 | I | Word clock (1) input terminal |
| 8 | DATA | I | Serial data input |
| 9 | BCLK | I | Serial bit clock input |
| 10 | $V_{DD}$ | I | Power supply terminal (connected to +5V) |
| 11 | TST OUT | O | Test output terminal (Not used, open) |
| 12 | TST1 | I | Test terminal (1) (connected to GND) |
| 13 | TST2 | I | Test terminal (2) (connected to GND) |
| 14 | IF | I | Interface select terminal (Not used, connected to +5V) |
| 15 | GND | I | GND terminal |
| 16 | VREFL 1 | I | Reference voltage "L" input terminal (1) (Not used, connected to GND) |
| 17 | GND | I | GND terminal |
| 18 | VREFL 2 | I | Reference voltage "L" input terminal (2) (Not used, connected to GND) |
| 19 | NC | — | Not connected |
| 20 | CH2 OUT | O | CH2 (Lch) data output |

| Function |
|---|
| signal output<br>Not used, open) |
| signal output<br>Not used, open) |
| output |
| rol clock signal |
| rol clock signal |
| ck output<br>or 8.6436MHz) |
| ly (connected to +5V) |

| Function |
|---|
| erminal<br>pen) |
| al (1)<br>to GND) |
| al (2)<br>to GND) |
| lect terminal<br>onnected to +5V) |
| nal |
| voltage "L" input<br>onnected to GND) |
| nal |
| voltage "L" input<br>connected to GND) |
| cted |
| data output |

# BLOCK DIAGRAM

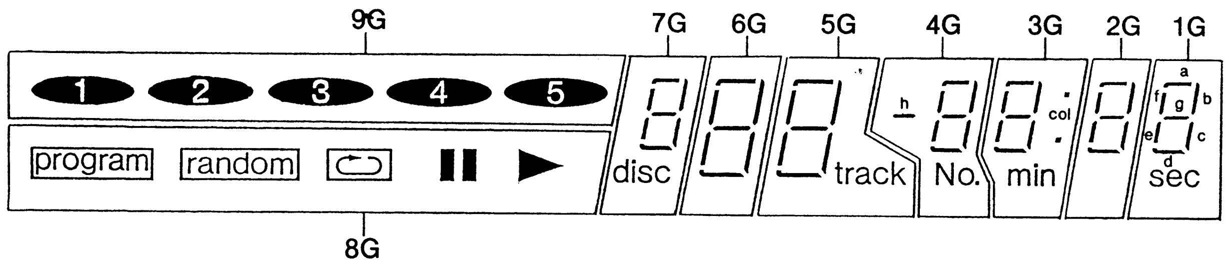

SERVO AMP
SERVO PROCESSOR
DIGITAL SIGNAL PROCESSING
OPTICAL PICKUP
Laser
PD
RF amp
Tracking coil
Focus coil
TRAVERSE UNIT
Traverse coil
AN8373S
IC101
Tracking balance adj (VR106)
VREF
Pot. buffer
Speed position sensor
Q101
Auto power control
APC driver
Phase shifter I.V amp
Addition (X2) balance
Best eye adj. (VR101)
Focus offset adj. (VR105)
FE mixing
BDO
EQ
HPF
RF det
RF amp (X30)
Tracking balance
Buffer (x4)
AGC
Pot. amp
T Loop filter
F Loop filter
T gain up
F.T gain down
F gain up
Tracking offset adj. (VR103)
Focus gain adj (VR104)
BTL DRIVE
Tracking coil drive
Focus coil drive
Traverse coil drive
RESET
AN8377N
IC103
AN8374S
IC102
Oscillation det.
Brake
SW
Search OSC
Speed control
DED Zone
TRV filter
Distinction of direction
CROSS det.
Waveform shaping
OFTR det.
Control logic
Selector
Auto focus
S-curve det.
Phase difference limiter
F-LOCK det.
DSL
PLL
Frequency detector
I/F
TRON
Tracking gain adj. (VR102)
TRVR
TRVF
CNT4
CNT3
CNT2
CNT1
SENSE
FLOCK
EFM
PCK
FPC
CLK
SRF
SDO
MN6625
IC301
Sync.pattern detection
Syncronism protection interpolation
PCK timing
EFM Frequency detection
EFM demodulation
Subcode demodulation CRC check
Syndrome computation flag count
Working RAM
CCU
ALU
Interpolation
RAM address generation
Digital Audio Interface
Interruption request
Peak detection
MCK timing
Microcomputer interface
Rough servo
Fine servo
CLV control
OSC
X301
CLDCK
BLKCK
SUBQ
DEMPH
OE
WE
RST
Input interface
Timing
CXK5816M
IC302
16K RAM
Row decoder
Memory array
Data control
Column I/O
Column decoder
Chip select, write enable output enable
Q301
Q427
BA4558FTI
IC351
Q351
Motor control
Q352,353
Motor drive
SPINDLE MOTOR
MOTOR DRIVE
BA6247N
IC404
Vcc
Motor drive
Control circuit
LOADING MOTOR
Q408
Q409
Q410
Q407
Q415,416
Motor control
FOW REV
LOADING
HIGH
SLOW
MN15283PJL
IC401
SYSTEM CONTROL
MRLY
OSCI
MLD
MCLK
MDATA
STAT
XI
VPP
PS0
PS3
D0
DC
S0~S8
FL drive
FL DISPLAY
T1
Power transformer
AC IN
S1
D5
Rectifier
Q3, D6
Regulator
Vpp(-27.7V)
To FL DISPLAY
D1~D4
Rectifier
SRUF15
ICP1
Protector
SRUF15
ICP2
Protector
D9
Rectifier
Q102
Regulator
LM2940T5M
IC1
Q1
Q4
Q2, D8
+B(8.5V)
+B(4.9V)
+B(7.7V)
+B(4.9V)
+B(6.2V)
+B(7.8V)
-B(-6.4V)
-B(-9.4V)


/O PROCESSOR
DIGITAL SIGNAL PROCESSING
MN6625
IC301
Sync.pattern detection
EFM Frequency detection
Syncronism protection interpolation
EFM. demodulation
PCK timing
Subcode demodulation CRC check
Syndrome computation flag count
Working RAM
CCU
ALU
Interpolation
RAM address generation
Digital Audio interface
Interruption request
Peak detection
MCK timing
Microcomputer interface
Rough servo
Fine servo
CLV control
OSC
X301
(DEMPH)
(CLDCK)
(BLKCK)
(SUBQ)
(PCK)
(FPC)
(SRF)
(OE)
(WE)
(RST)
(PC)
(EC)
DO
(TRON)
(XCK)
(LPCK)
(WDCK)
(SMCK)
(MDATA)
(MCLK)
(MLD)
(STAT)
(DMUTE)
+B
VREF
Speed control
DED Zone
TRV filter
SW
Distinction of direction
CROSS det.
Waveform shaping
OFTR det
Control logic
Selector
Auto focus
S-curve det
PLL
Frequency detector
I/F
(TRVR)
(TRVF)
(CNT4)
(CNT3)
(CNT2)
(CNT1)
(SENSE)
(FLOCK)
(EFM)
(PCK)
(FPC)
(CLK)
(SRF)
(SDO)
DIGITAL FILTER
SM5807ESET
IC801
Timing control
ROM
Multiplier / Accumulator
Input interface
Shift register
Shift register
Over flow limiter
Output interface
D/A CONVERTER
LC7881B
IC802
Timing Control
SIPO Register
Selector
Test Circuit
CH1 Latch
CH2 Latch
Level Shift DAC
R-string DAC
PWM DAC
BA4558FTI
IC804
IC803
L. P. F.
Rch
Lch
LINE OUT
Q801,802,805
Emphasis drive
Q807,808,809
Muting drive
CXK5816M
IC302
16K RAM
Row decoder
Memory array
Data control
Column I/O
Column decoder
Chip select, write enable output enable
(OE)
(WE)
Q301
RESET CONTROL
M51953BFPTA
IC2
REMOTE CONTROL TRANSMITTER
MN6014E
IC1
Q1
LED drive
Modulation
Pulse generator
11 Bit latch
Chattering simuldep-ression inhibit
Timing generation circuit
Key input control circuit
Key switch
Remote control receiver
HC-MDIOE
IC601
VDD
VSS
BA4558FTI
IC351
Q351
Motor control
Q352,353
Motor drive
SPINDLE MOTOR
MOTOR DRIVE
Motor drive
Motor drive
Motor drive
Control circuit
Q408
Q409
Q410
Q407
Q415,416
Motor control
FOW / REV
(LOADING)
(HIGH)
(SLOW)
LOADING MOTOR
(CNT2)
(CNT4)
(CNT3)
(CNT1)
(FLOCK)
(SENSE)
(TRV-R)
(TRV-F)
(MRLY)
(OSC1)
(MLD)
(MCLK)
(MDATA)
(STAT)
(BLKCK)
(CLDCK)
(SUBQ)
MN15283PJL
IC401
SYSTEM CONTROL
RST
PS0
PS3
D0
DC
VPP
-B
S0～S8
Key matrix
FL drive
Q401～406,422
FL DISPLAY
MN1550PEB
IC403
REMOTE CONTROL
RST
P20
P10
P13
P00
P03
R0

**Note)**
• ——▶ Audio signal

# INTERNAL CONNECTION OF FL

## • Grid connection diagram


9G
7G
6G
5G
4G
3G
2G
1G
1
2
3
4
5
program
random
disc
track
h
No.
col
min
sec
a
b
c
d
e
f
g
8G

## • Anode connection table

| | 9G | 8G | 7G | 6G | 5G | 4G | 3G | 2G | 1G |
|---|---|---|---|---|---|---|---|---|---|
| a | – | – | a | a | a | a | a | a | a |
| b | ⑤ | program | b | b | b | b | b | b | b |
| c | ④ | random | c | c | c | c | c | c | c |
| d | ③ | – | d | d | d | d | d | d | d |
| e | ② | – | e | e | e | e | e | e | e |
| f | ① | ▶ | f | f | f | f | f | f | f |
| g | – | ⟲ | g | g | g | g | g | g | g |
| h | – | ▮▮ | disc | – | track | ▬ | min , col | – | sec |
| i | – | – | – | – | – | No. | – | – | – |

## • Pin connection

| PIN NO. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CONNECTION | F1 | F1 | NP | NP | NP | NP | NP | NP | NP | NP | NP | NP | NP | NP | NP | NP | NP | NP | NP | NP | 8G | 7G | 6G | 5G | 4G | 3G | 2G |
| PIN NO. | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | | | | | | | | | | | | |
| CONNECTION | 1G | 9G | i | h | g | f | e | d | c | b | a | NP | NP | F2 | F2 | | | | | | | | | | | | |

# SCHEMATIC DIAGRAM

(Parts list on pages 39 ~ 47)

(This schematic diagram may be modified at any time with development of new technology.)

**Notes:**

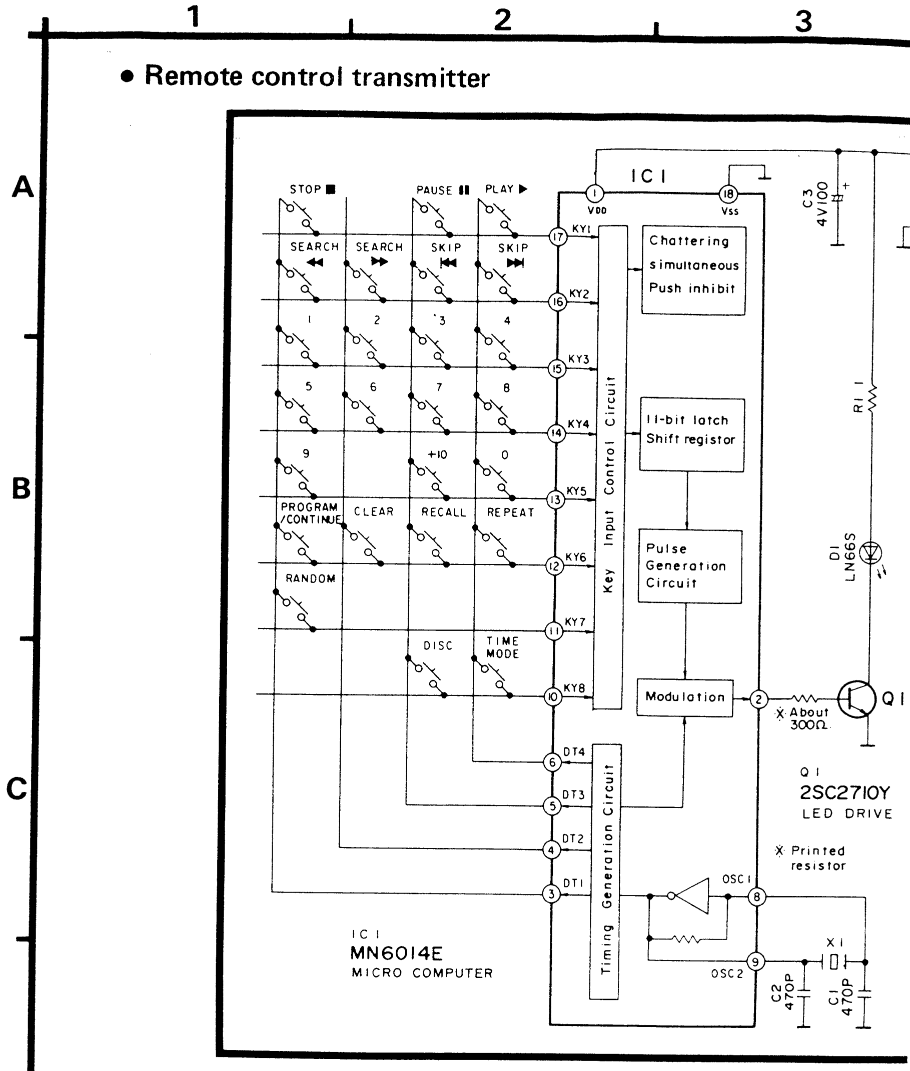
- **S1** : Power switch in "**on**" position.
- **S401~405** : Disc select (disc, 1~5) switches.
  〔S401: 1, S402: 2, S403: 3, S404: 4, S405: 5〕
- **S406** : Time mode select (time mode) switch.
- **S407, 408** : Skip (⏮ skip ⏭) switches.
  S407: ⏮, S408: ⏭
- **S409, 410** : Search (◀◀ search ▶▶) switches.
  S409: ◀◀, S410: ▶▶
- **S411** : Program/continue (program/continue) switch.
- **S412** : Repeat (repeat) switch.
- **S413** : Pause (▮▮ pause) switch.
- **S414** : Play (▶ play) switch.
- **S415** : Random (random) switch.
- **S416** : Stop (■ stop) switch.
- **S417** : Disc skip (disc skip) switch.
- **S451** : Clamp switch.
- The voltage value and waveforms are the reference voltage of this unit measured by DC electronic voltmeter (high impedance) and oscilloscope on the basis of chassis.
  Accordingly, there may arise some error in voltage values and waveforms depending upon the internal impedance of the tester or the measuring unit.
  *The parenthesized are the values of voltage generated during playing (Test disc 1kHz, L+R, 0dB), others are voltage values in stop mode.
- Important safety notice:
  Components identified by ⚠ mark have special characteristics important for safety. When replacing any of these components, use only manufacturer's specified parts.
- —< >—/···< >···: Positive voltage lines and negative voltage lines.
  ░░░ : audio signal lines.

**Caution!**

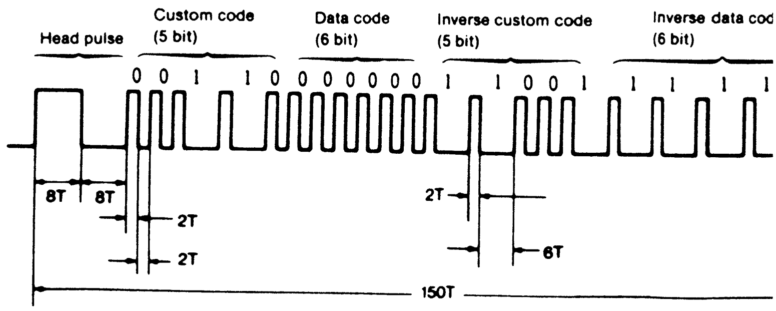
IC and LSI are sensitive to static electricity.
Secondary trouble can be prevented by taking care during repair.

- Cover the parts boxes made of plastics with aluminum foil.
- Ground the soldering iron.
- Put a conductive mat on the work table.
- Do not touch the pins of IC or LSI with fingers directly.

- Remote control transmitter


1
2
3
A
B
C
D
E
F
STOP ■
PAUSE ▮▮
PLAY ▶
SEARCH ◀◀
SEARCH ▶▶
SKIP ⏮
SKIP ⏭
1
2
3
4
5
6
7
8
9
+10
0
PROGRAM /CONTINUE
CLEAR
RECALL
REPEAT
RANDOM
DISC
TIME MODE
IC I
1
VDD
18
Vss
KY1
KY2
KY3
KY4
KY5
KY6
KY7
KY8
17
16
15
14
13
12
11
10
Key Input Control Circuit
Chattering simultaneous Push inhibit
11-bit latch Shift register
Pulse Generation Circuit
Modulation
2
DT4
DT3
DT2
DT1
6
5
4
3
Timing Generation Circuit
OSC1
8
OSC2
9
IC I
MN6014E
MICRO COMPUTER
C3 4V100
RI I
DI LN66S
Q I
※ About 300Ω
Q I
2SC2710Y
LED DRIVE
※ Printed resistor
X I
C2 470P
C1 470P

- Key number description and data code

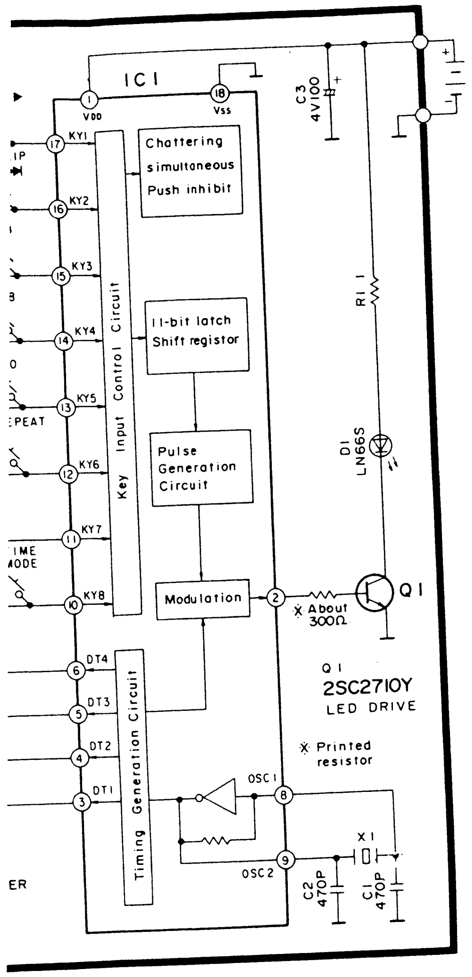

Head pulse
Custom code (5 bit)
Data code (6 bit)
Inverse custom code (5 bit)
Inverse data cod (6 bit)
0 0 1 1 0
0 0 0 0 0 0
1 1 0 0 1
1 1 1 1
8T
8T
2T
2T
2T
6T
150T

### Custom code: 01100

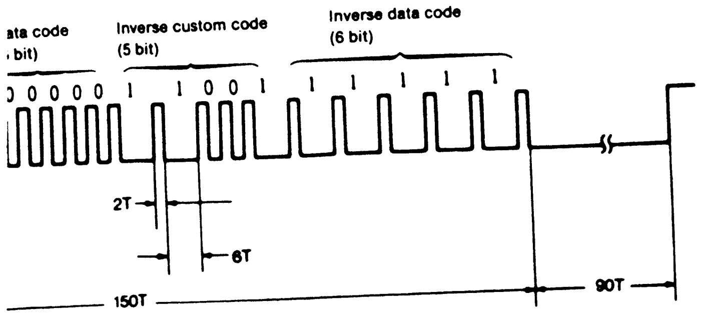
| Function | Data code |
|---|---|
| play ▶ | 001010 |
| skip ⏭ | 000011 |
| 4 | 010011 |
| 8 | 010111 |
| 0 | 011001 |
| repeat | 000111 |
| time mode | 101001 |
| pause ▮▮ | 000110 |
| skip ⏮ | 000010 |

| Function | Data code |
|---|---|
| 3 | 010010 |
| 7 | 010110 |
| +10 | 011010 |
| recall | 001001 |
| disc | 100110 |
| search ▶▶ | 000101 |
| 2 | 010001 |
| 6 | 010101 |
| clear | 001011 |

| |
|---|
| sto |
| sea |
| |
| |
| |
| pr<br>co |
| rar |


IC1
BATTERY 3V
VDD
Vss
KY1
KY2
KY3
KY4
KY5
KY6
KY7
KY8
Chattering simultaneous Push inhibit
11-bit latch Shift register
Pulse Generation Circuit
Modulation
Key Input Control Circuit
Timing Generation Circuit
DT1
DT2
DT3
DT4
OSC1
OSC2
C3 4V100
R1 1
D1 LN66S
Q1
※ About 300Ω
Q1 2SC2710Y LED DRIVE
※ Printed resistor
X1
C2 470P
C1 470P
EPEAT
IME MODE
ER

## d data code


ata code
bit)
Inverse custom code (5 bit)
Inverse data code (6 bit)
0 0 0 0 0 1 1 0 0 1 1 1 1 1 1
2T
6T
150T
90T

fosc = 420 kHz

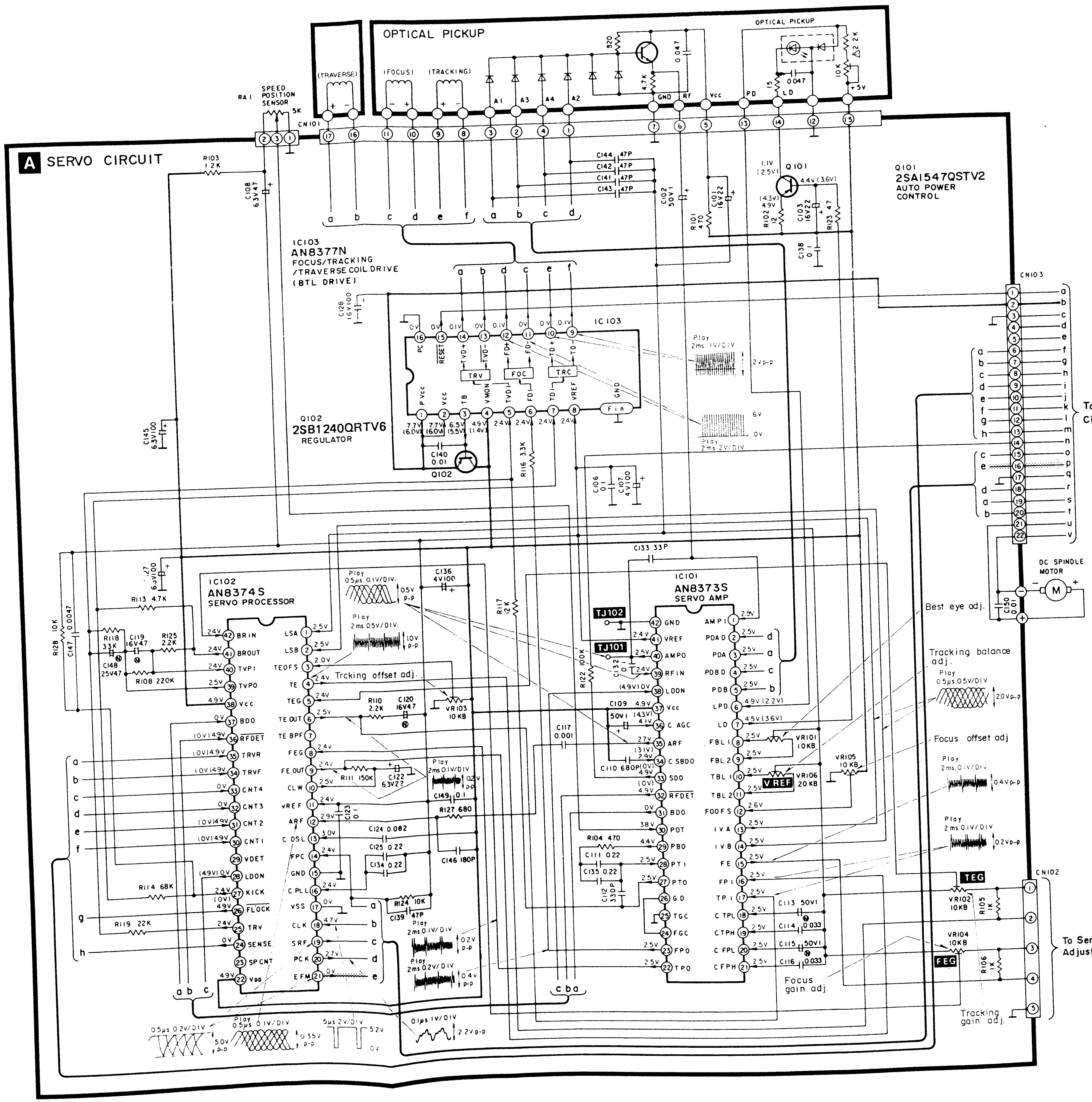
fcar = fosc/12

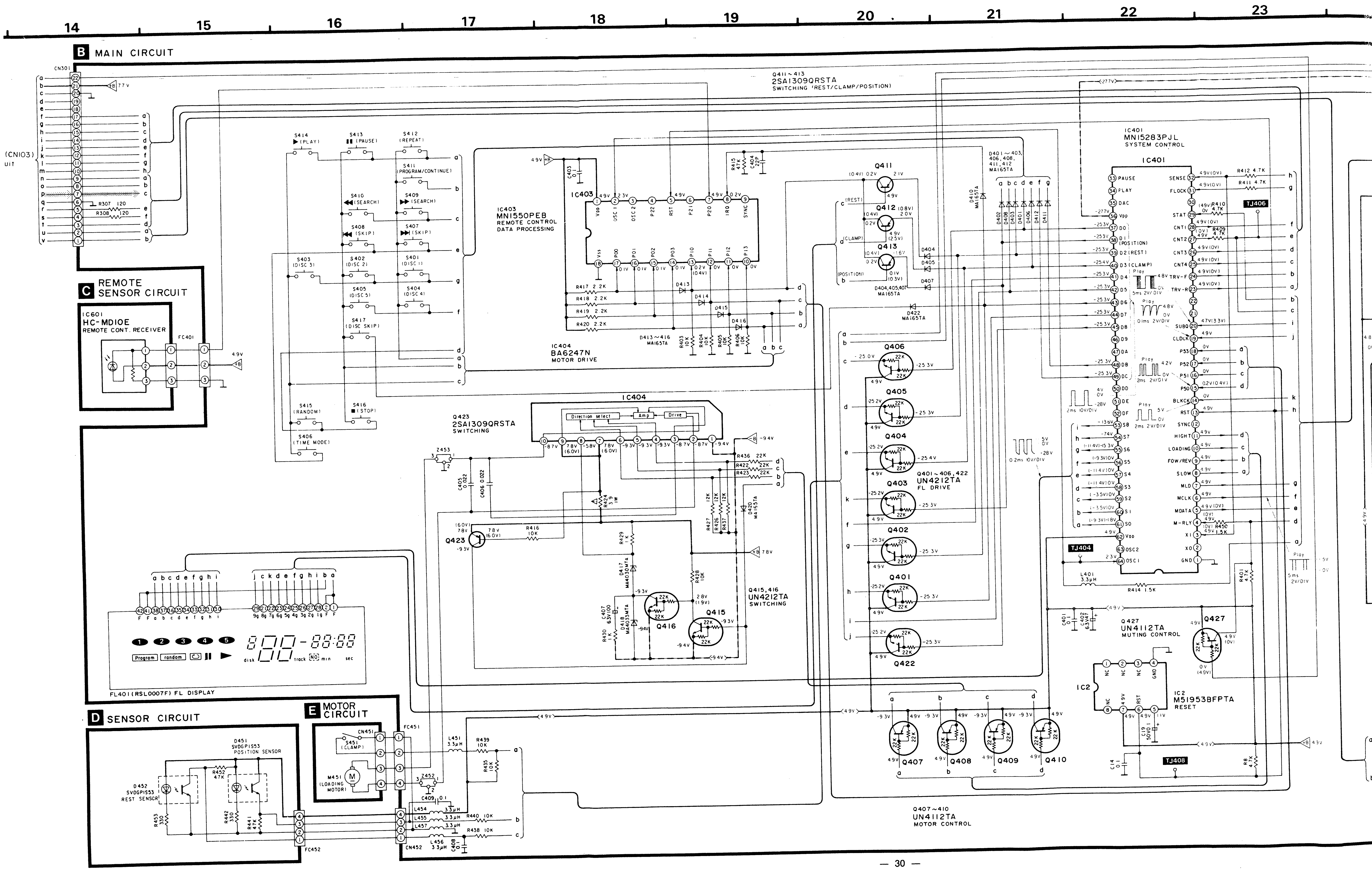
fclk = fosc/16

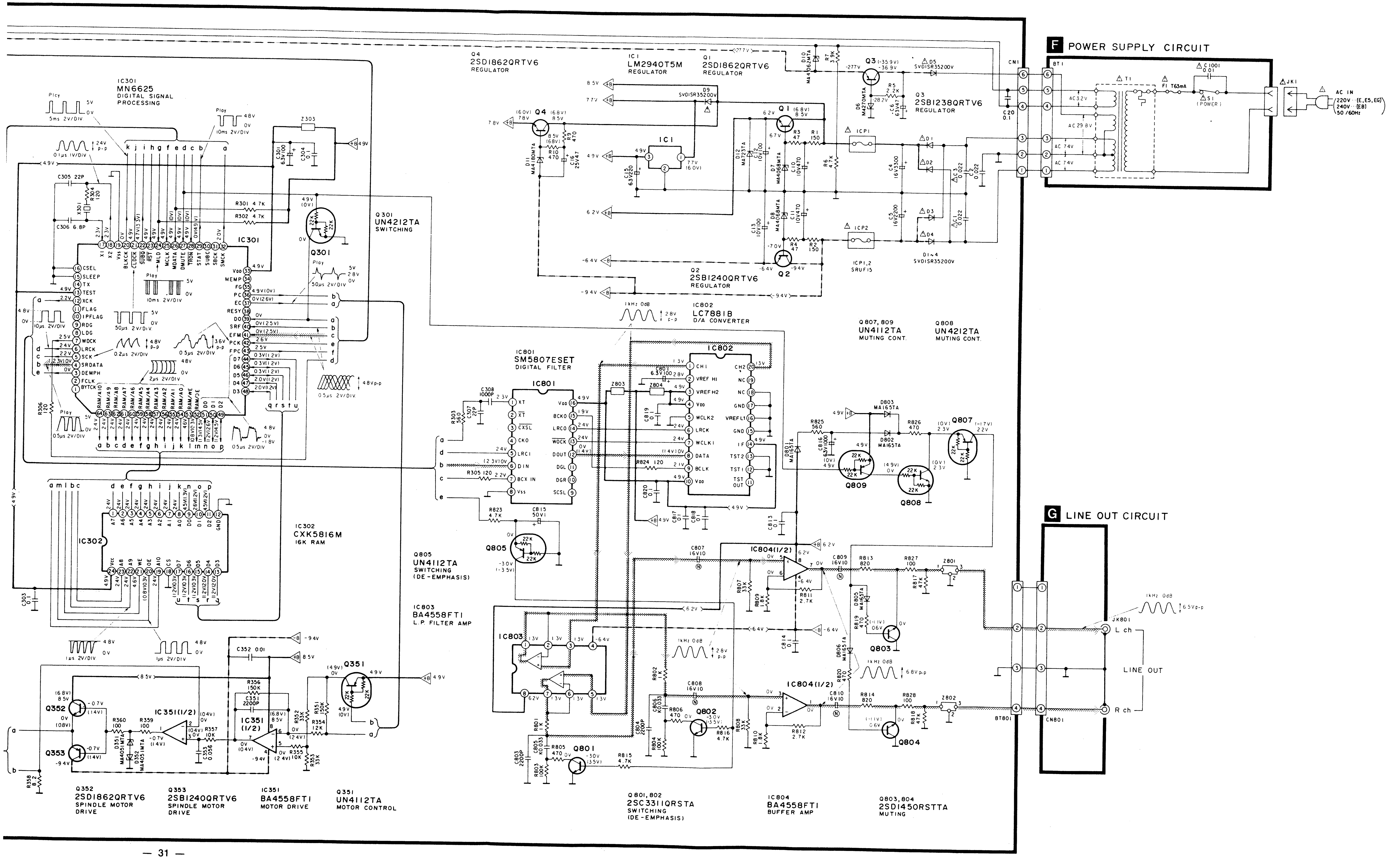
T = 1/fclk

| Function | Data code |
|---|---|
| 3 | 010010 |
| 7 | 010110 |
| +10 | 011010 |
| recall | 001001 |
| disc | 100110 |
| search ▶▶ | 000101 |
| 2 | 010001 |
| 6 | 010101 |
| clear | 001011 |

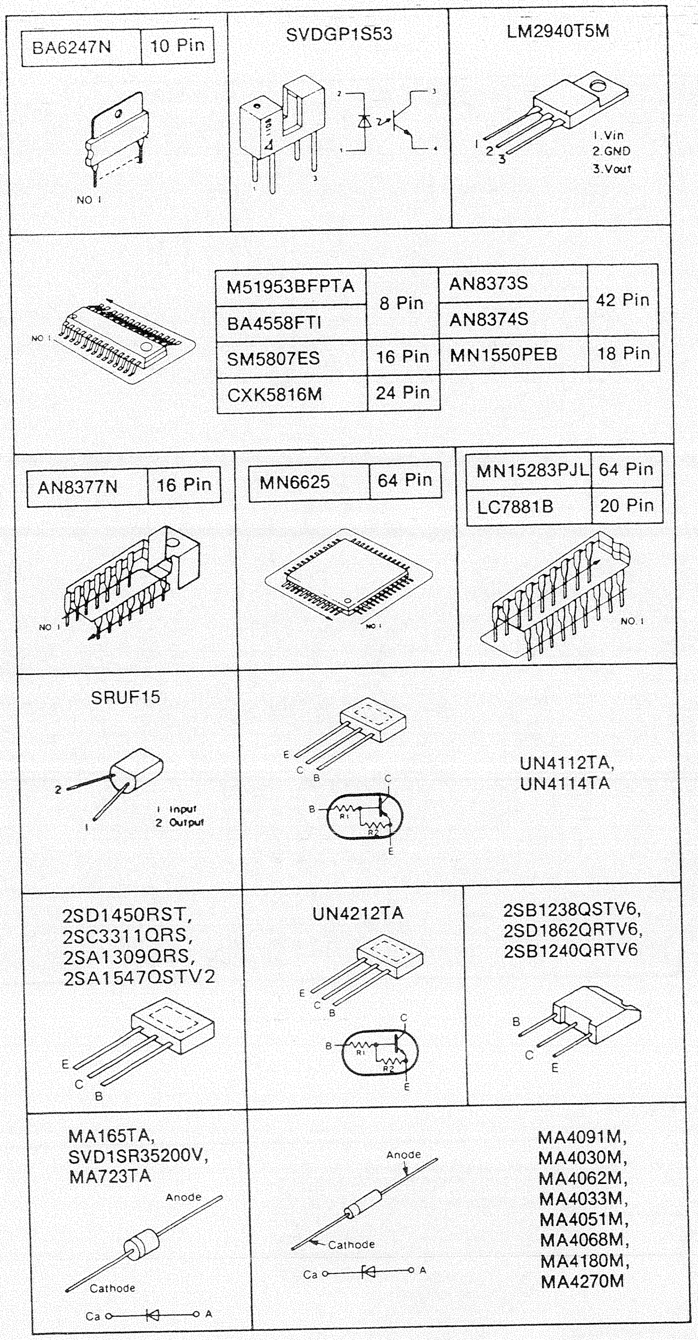
| Function | Data code |
|---|---|
| stop ■ | 000000 |
| search ◀◀ | 000100 |
| 1 | 010000 |
| 5 | 010100 |
| 9 | 011000 |
| program/<br>continue | 011101 |
| random | 011111 |


A SERVO CIRCUIT
OPTICAL PICKUP
(TRAVERSE)
(FOCUS)
(TRACKING)
SPEED POSITION SENSOR
RA1
5K
CN101
R103 1.2K
C108 6.3V47
IC103 AN8377N FOCUS/TRACKING /TRAVERSE COIL DRIVE (BTL DRIVE)
Q102 2SB1240QRTV6 REGULATOR
C140 0.01
R116 3.3K
C106 0.1
C107 4V100
C128 16V100
C145 6.3V100
Q101 2SA1547QSTV2 AUTO POWER CONTROL
C144 47P
C142 47P
C141 47P
C143 47P
C102 50V1
C101 16V22
R101 470
R102 12
C103 16V22
R123 4.7
C138 0.1
Play 2ms 1V/DIV 2Vp-p
6V 0V Play 2ms 2V/DIV
CN103
To B (CN301) Circuit
DC SPINDLE MOTOR
C150 0.01
IC102 AN8374S SERVO PROCESSOR
IC101 AN8373S SERVO AMP
TJ102
TJ101
C133 33P
C136 4V100
R113 4.7K
R128 10K
C147 0.0047
R118 33K
C119 16V47
R125 22K
C148 25V47
R108 220K
R110 2.2K
C120 16V47
VR103 10KB
Trcking offset adj.
R111 150K
C122 6.3V22
C149 0.1
R127 680
C124 0.082
C125 0.22
C134 0.22
C146 180P
R124 10K
C139 47P
R114 68K
R119 22K
R117 12K
R122 100K
C132 0.1
C109 50V1
C110 680P
C117 0.001
R104 470
C111 0.22
C135 0.22
C112 330P
C113 50V1
C114 0.033
C115 50V1
C116 0.033
VR101 10KB
VR106 20KB
VREF
VR105 10KB
VR102 10KB
R105 1K
VR104 10KB
R106 1K
TEG
FEG
CN102
To Servo Gain Adjuster
Best eye adj.
Tracking balance adj.
Play 0.5μs 0.5V/DIV 2.0Vp-p
Focus offset adj
Play 2ms 0.1V/DIV 0.4Vp-p
Play 2ms 0.1V/DIV 0.2Vp-p
Focus gain adj.
Tracking gain adj.
Play 0.5μs 0.1V/DIV 0.5V p-p
Play 2ms 0.5V/DIV 1.0V p-p
Play 2ms 0.1V/DIV 0.2V p-p
Play 2ms 0.2V/DIV 0.4V p-p
0.5μs 0.2V/DIV 5.0V p-p
Play 0.5μs 0.1V/DIV 0.35V p-p
5μs 2V/DIV 5.2V 0V
0.1μs 1V/DIV 2.2Vp-p
BRIN BROUT TVPI TVPO Vcc BDO RFDET TRVR TRVF CNT4 CNT3 CNT2 CNT1 VDET LDON KICK FLOCK TRV SENSE SPCNT VDD
LSA LSB TEOFS TE TEG TE OUT TE BPF FEG FE OUT CLW VREF ARF C DSL FPC GND C PLL VSS CLK SRF PCK EFM
GND VREF AMPO RFIN LDON Vcc C AGC ARF C SBDO SDO RFDET BDO POT PBO PTI PTO GO TGC FGC FPO TPO
AMPI PDA D PDA PDB D PDB LPD LD FBL1 FBL2 TBL1 TBL2 FOOFS IVA IVB FE FPI TPI C TPL CTPH C FPL CFPH

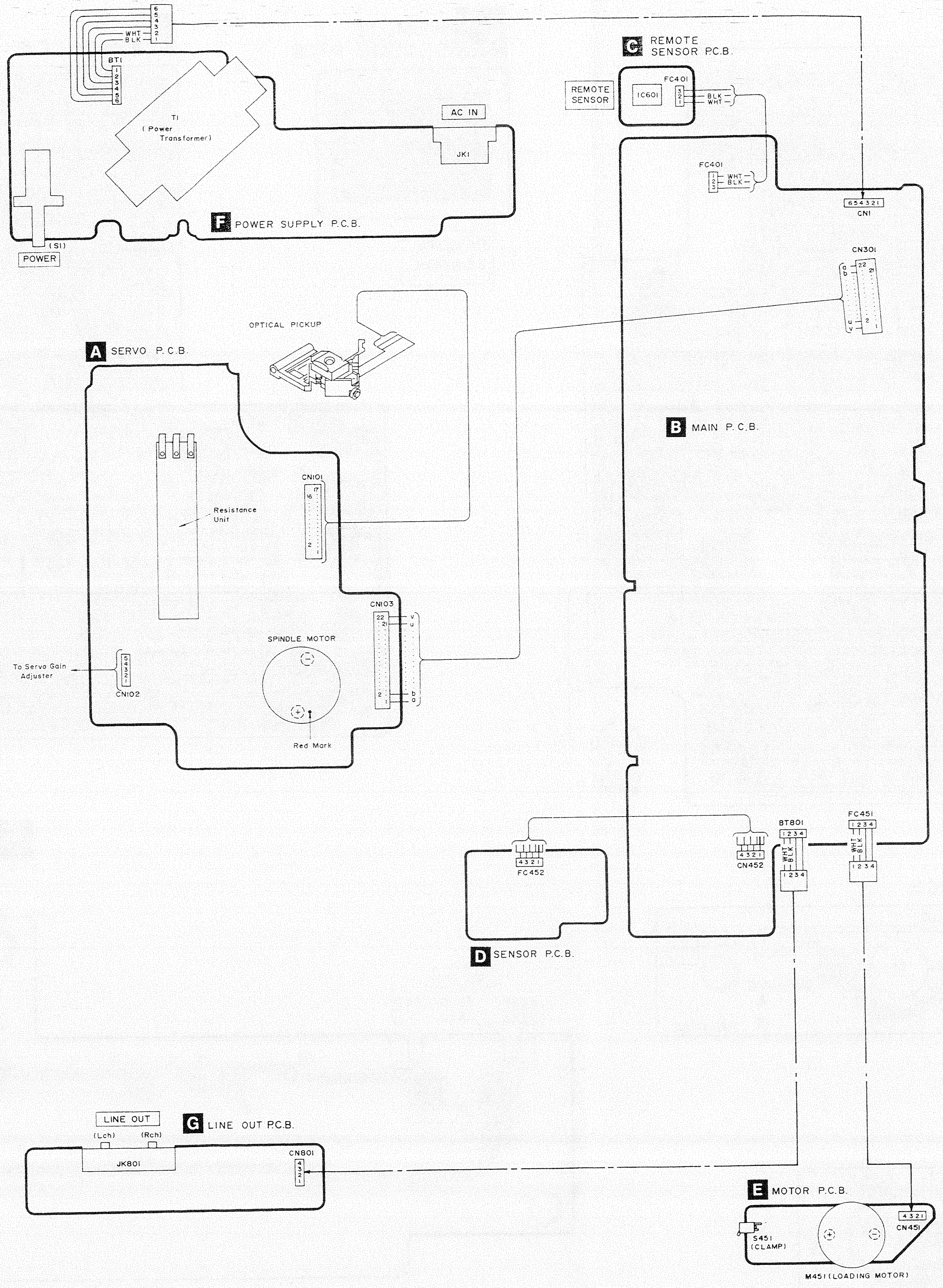
14
15
16
17
18
19
20
21
22
23
B MAIN CIRCUIT
CN301
(CN103) U1T
C REMOTE SENSOR CIRCUIT
IC601
HC-MD10E
REMOTE CONT. RECEIVER
FC401
D SENSOR CIRCUIT
D451 SVDGP1S53 POSITION SENSOR
D452 SVDGP1S53 REST SENSOR
FC452
E MOTOR CIRCUIT
CN451
S451 (CLAMP)
M451 (LOADING MOTOR)
FC451
CN452
S414 ▶ (PLAY)
S413 ❚❚ (PAUSE)
S412 (REPEAT)
S411 (PROGRAM/CONTINUE)
S410 (SEARCH)
S409 (SEARCH)
S408 (SKIP)
S407 (SKIP)
S403 (DISC 3)
S402 (DISC 2)
S401 (DISC 1)
S405 (DISC 5)
S404 (DISC 4)
S417 (DISC SKIP)
S415 (RANDOM)
S416 ■ (STOP)
S406 (TIME MODE)
IC403 MN1550PEB REMOTE CONTROL DATA PROCESSING
IC404 BA6247N MOTOR DRIVE
IC404
Direction select
Amp
Drive
Q423 2SA1309QRSTA SWITCHING
Q415,416 UN4212TA SWITCHING
Q411~413 2SA1309QRSTA SWITCHING (REST/CLAMP/POSITION)
D401~403, 406, 408, 411, 412 MA165TA
D404,405,407 MA165TA
D413~416 MA165TA
D422 MA165TA
Q401~406, 422 UN4212TA FL DRIVE
IC401 MN15283PJL SYSTEM CONTROL
Q427 UN4112TA MUTING CONTROL
IC2 M51953BFPTA RESET
Q407~410 UN4112TA MOTOR CONTROL
TJ404
TJ406
TJ408
FL401 (RSL0007F) FL DISPLAY
Program
random
disk
track
min
sec


F POWER SUPPLY CIRCUIT
G LINE OUT CIRCUIT
IC301 MN6625 DIGITAL SIGNAL PROCESSING
Q301 UN4212TA SWITCHING
IC302 CXK5816M 16K RAM
Q4 2SD1862QRTV6 REGULATOR
IC1 LM2940T5M REGULATOR
Q1 2SD1862QRTV6 REGULATOR
Q3 2SB1238QRTV6 REGULATOR
Q2 2SB1240QRTV6 REGULATOR
IC802 LC7881B D/A CONVERTER
IC801 SM5807ESET DIGITAL FILTER
Q807, 809 UN4112TA MUTING CONT.
Q808 UN4212TA MUTING CONT.
Q805 UN4112TA SWITCHING (DE-EMPHASIS)
IC803 BA4558FT1 L.P. FILTER AMP
IC804(1/2)
IC351(1/2)
Q352 2SD1862QRTV6 SPINDLE MOTOR DRIVE
Q353 2SB1240QRTV6 SPINDLE MOTOR DRIVE
IC351 BA4558FT1 MOTOR DRIVE
Q351 UN4112TA MOTOR CONTROL
Q801, 802 2SC3311QRSTA SWITCHING (DE-EMPHASIS)
IC804 BA4558FT1 BUFFER AMP
Q803, 804 2SD1450RSTTA MUTING
T1
F1 T63mA
C1001 0.01
S1 (POWER)
JK1
AC IN (220V (E, E5, EG) 240V (EB) 50/60Hz)
ICP1
ICP2
ICP1,2 SRUF15
D1~4 SV01SR35200V
D5 SV01SR35200V
D9 SV01SR35200V
CN1
BT1
BT801
CN801
JK801
L ch
R ch
LINE OUT
1kHz 0dB 6.5Vp-p
X301
Z303
Z801
Z802
Z803
Z804
Play
5ms 2V/DIV
10ms 2V/DIV
0.1μs 1V/DIV
50μs 2V/DIV
0.2μs 2V/DIV
0.5μs 2V/DIV
2μs 2V/DIV
10μs 2V/DIV
1μs 2V/DIV
1kHz 0dB 2.8V p-p
1kHz 0dB 6.8Vp-p

## TERMINAL GUIDE OF IC'S, TRANSISTORS AND DIODES

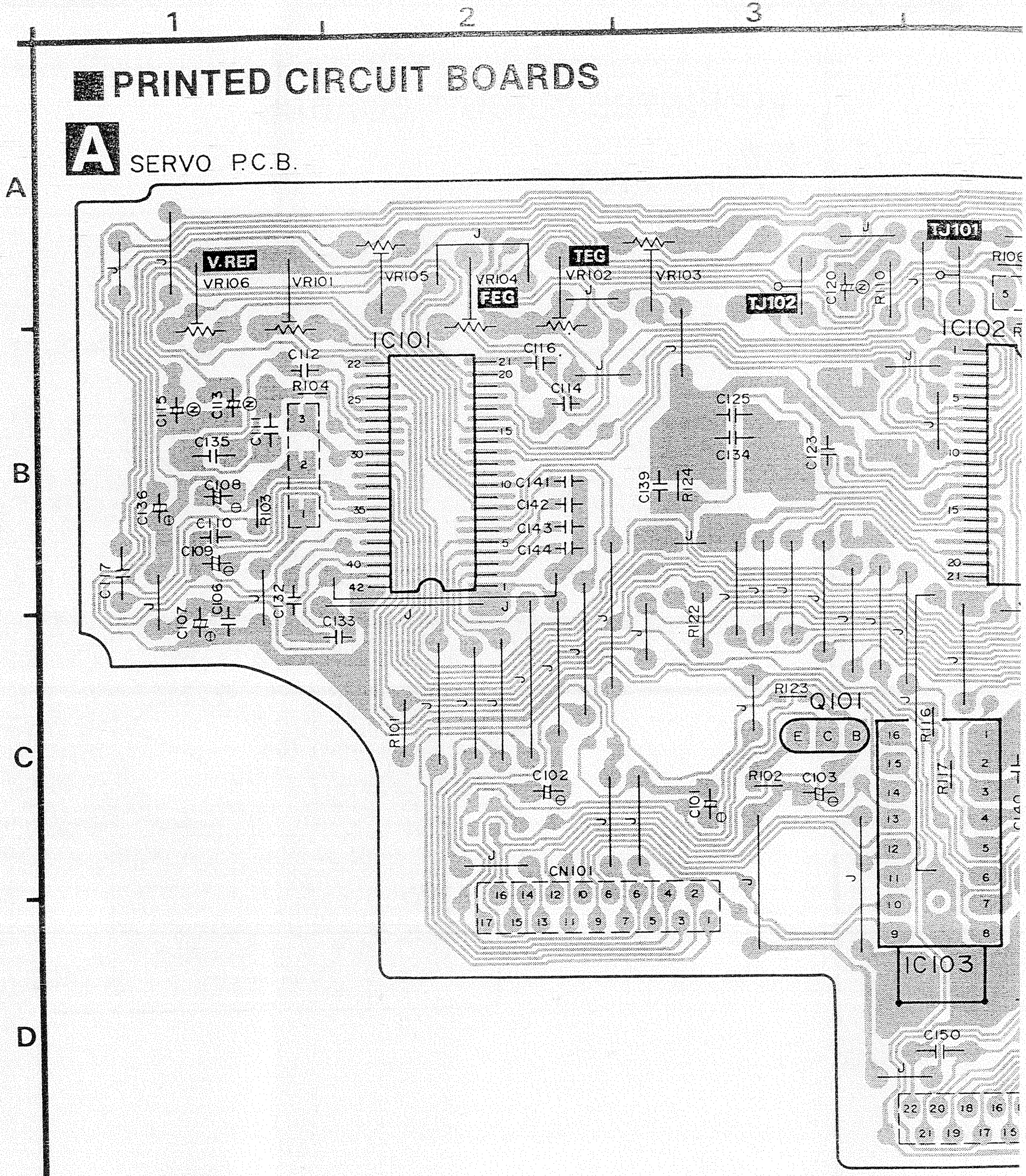

BA6247N
10 Pin
NO 1
SVDGP1S53
LM2940T5M
1.Vin
2.GND
3.Vout
M51953BFPTA
BA4558FTI
8 Pin
SM5807ES
16 Pin
CXK5816M
24 Pin
AN8373S
AN8374S
42 Pin
MN1550PEB
18 Pin
NO 1
AN8377N
16 Pin
MN6625
64 Pin
MN15283PJL
64 Pin
LC7881B
20 Pin
NO 1
SRUF15
1 Input
2 Output
UN4112TA,
UN4114TA
E
C
B
2SD1450RST,
2SC3311QRS,
2SA1309QRS,
2SA1547QSTV2
UN4212TA
R1
R2
2SB1238QSTV6,
2SD1862QRTV6,
2SB1240QRTV6
MA165TA,
SVD1SR35200V,
MA723TA
Anode
Cathode
Ca
A
MA4091M,
MA4030M,
MA4062M,
MA4033M,
MA4051M,
MA4068M,
MA4180M,
MA4270M

## WIRING CONNECTION DIAGRAM

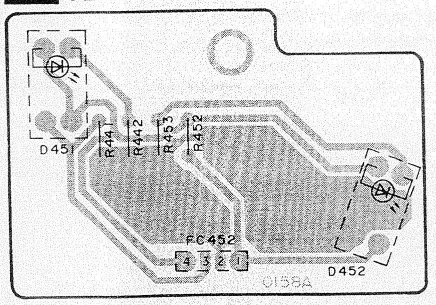

WHT
BLK
BT1
T1
(Power Transformer)
AC IN
JK1
F POWER SUPPLY P.C.B.
(S1)
POWER
C REMOTE SENSOR P.C.B.
REMOTE SENSOR
IC601
FC401
BLK
WHT
CN1
654321
CN301
OPTICAL PICKUP
A SERVO P.C.B.
CN101
Resistance Unit
CN103
SPINDLE MOTOR
To Servo Gain Adjuster
CN102
Red Mark
B MAIN P.C.B.
BT801
FC451
FC452
CN452
D SENSOR P.C.B.
LINE OUT
(Lch)
(Rch)
JK801
G LINE OUT P.C.B.
CN801
E MOTOR P.C.B.
S451
(CLAMP)
CN451
M451 (LOADING MOTOR)

## PRINTED CIRCUIT BOARDS

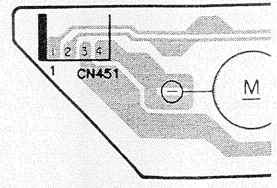
A SERVO P.C.B.


1
2
3
A
B
C
D
E
F
G
V.REF
VR106
VR101
VR105
VR104
FEG
TEG
VR102
VR103
TJ101
TJ102
IC101
IC102
IC103
Q101
E C B
CN101
C112
R104
C116
C114
C125
C134
C123
C120
R110
R106
C115
C113
C111
C135
C108
C110
C109
R103
C136
C107
C106
C117
C132
C133
C139
R124
C141
C142
C143
C144
R122
R123
R101
C102
C101
R102
C103
R116
R117
C150

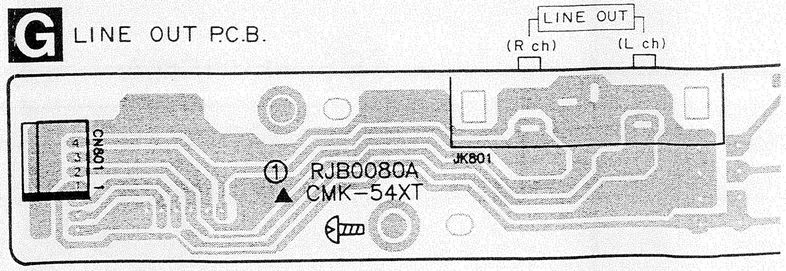
D SENSOR P.C.B.


D451
R441
R442
R453
R452
FC452
4 3 2 1
D452
0158A

E MOTOR P.C.B.

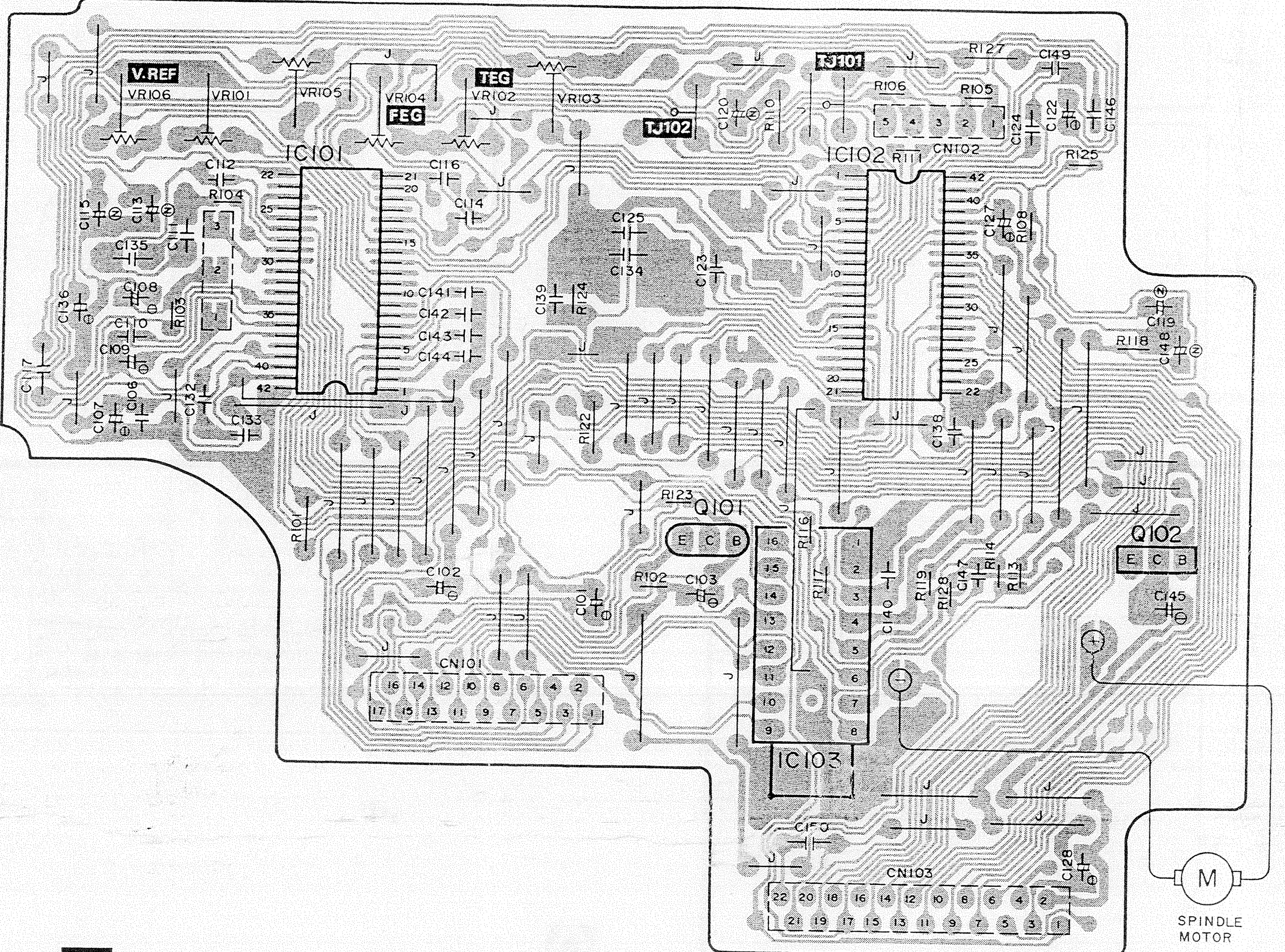

1 2 3 4
CN451
M

G LINE OUT P.C.B.

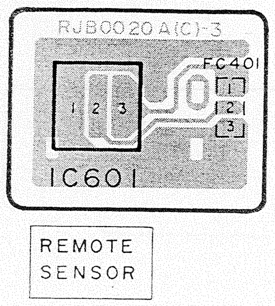

LINE OUT
(R ch)
(L ch)
CN801
JK801
① RJB0080A
▲ CMK-54XT

# PRINTED CIRCUIT BOARDS

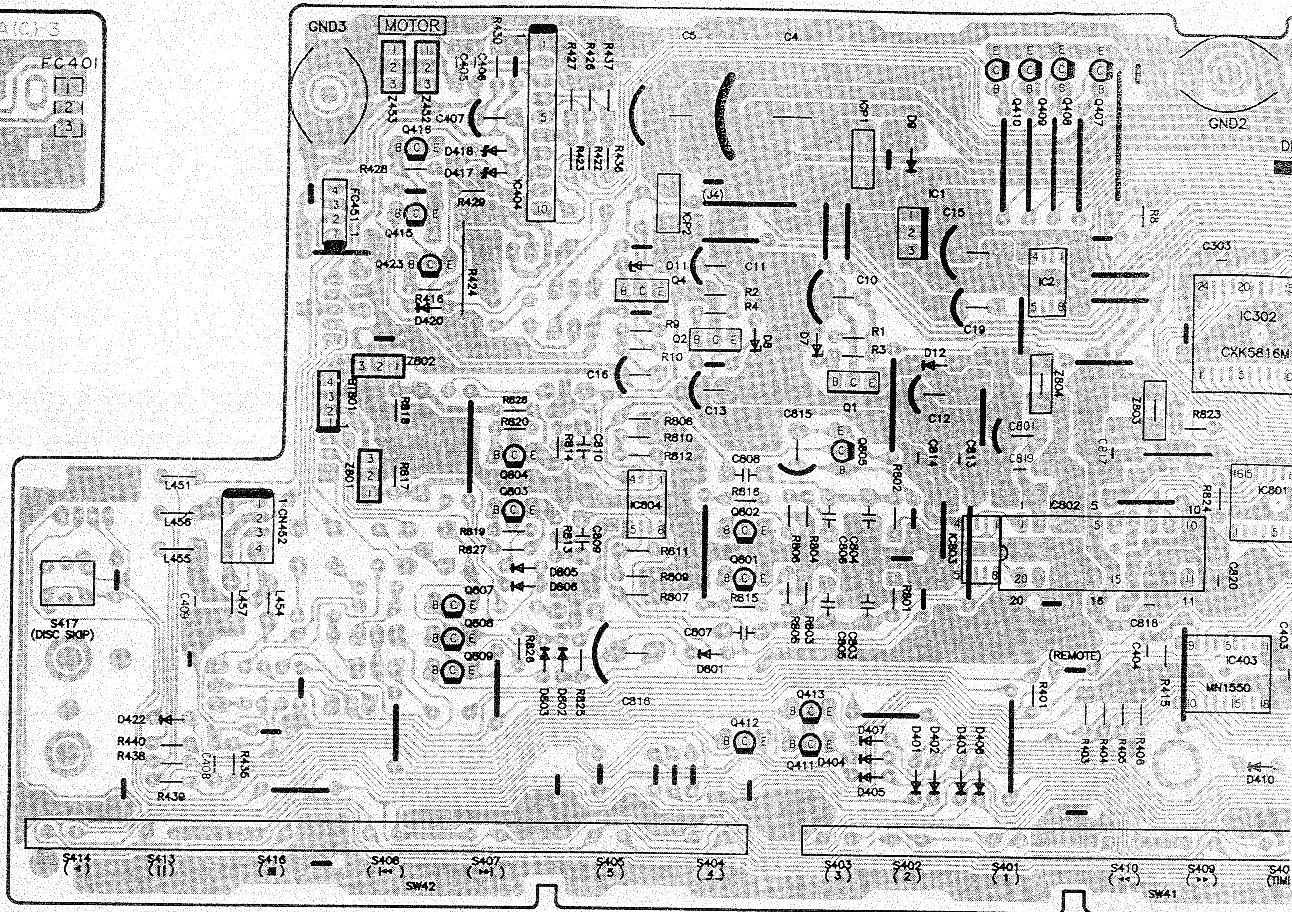
## A SERVO P.C.B.


V.REF
VR106
VR101
VR105
VR104
FEG
TEG
VR102
VR103
TJ101
TJ102
IC101
IC102
IC103
Q101
Q102
CN101
CN102
CN103
SPINDLE MOTOR
M

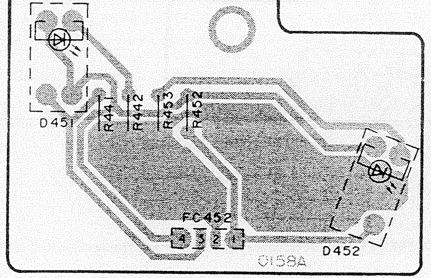
## C REMOTE SENSOR P.C.B


RJB0020 A(C)-3
FC401
IC601
REMOTE SENSOR

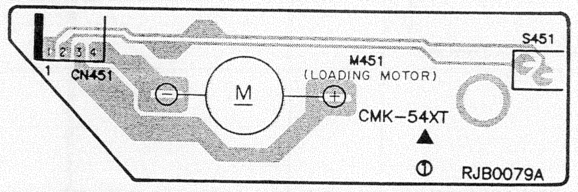
## B MAIN P.C.B.


GND3
MOTOR
GND2
IC1
IC2
IC302
CXK5816M
IC801
IC802
IC803
IC403
MN1550
CN452
S417 (DISC SKIP)
(REMOTE)
S414
S413
S416
S406
S407
S405
S404
S403
S402
S401
S410
S409
SW42
SW41

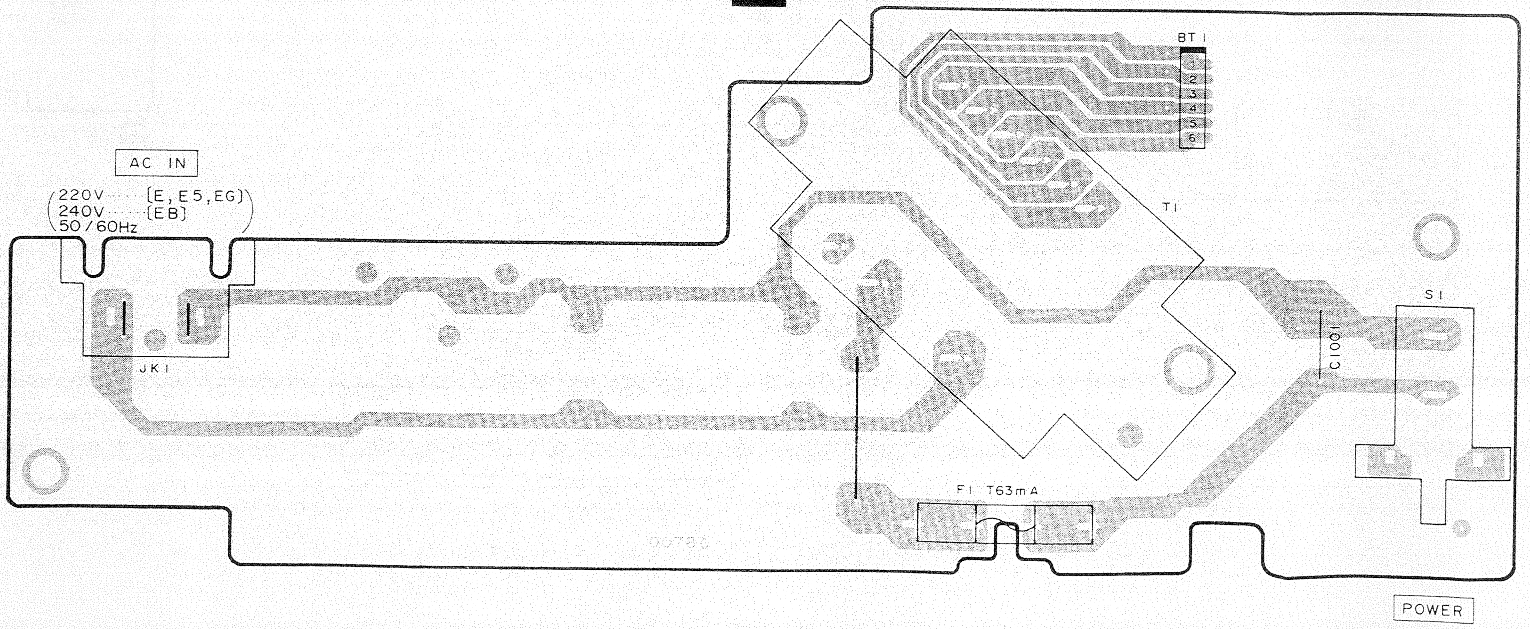
## D SENSOR P.C.B.


D451
R441
R442
R453
R452
FC452
D452
0158A

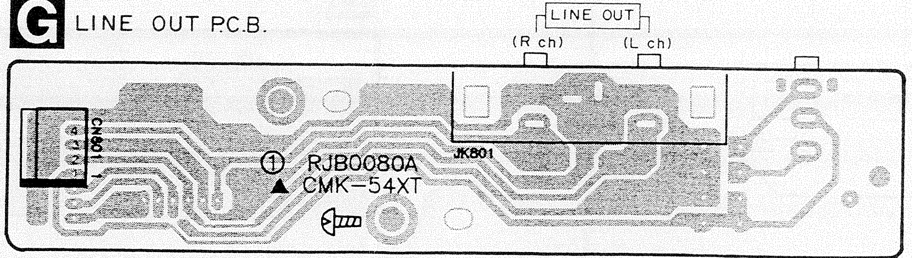
## E MOTOR P.C.B.

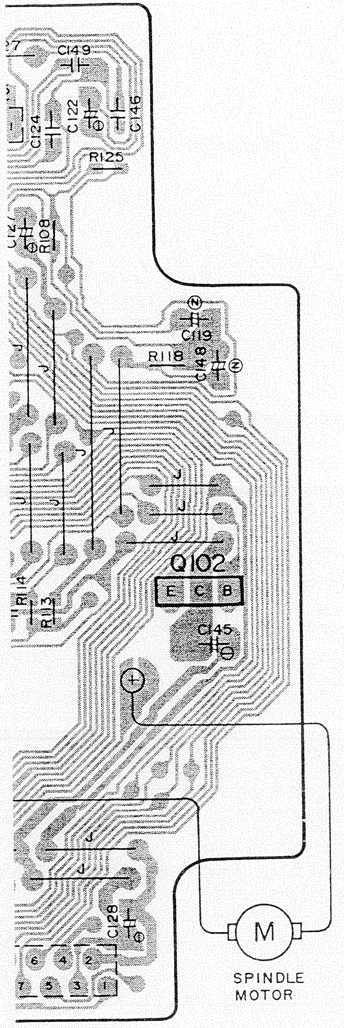

CN451
M451 (LOADING MOTOR)
M
S451
CMK-54XT
RJB0079A

## F POWER SUPPLY P.C.B.

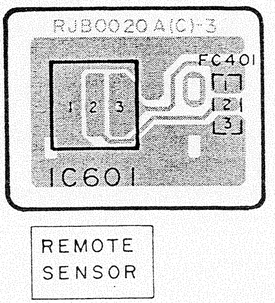

AC IN
220V ······ (E, E5, EG)
240V ······ (EB)
50/60Hz
JK1
BT1
T1
S1
C1001
F1 T63mA
POWER

## G LINE OUT P.C.B.

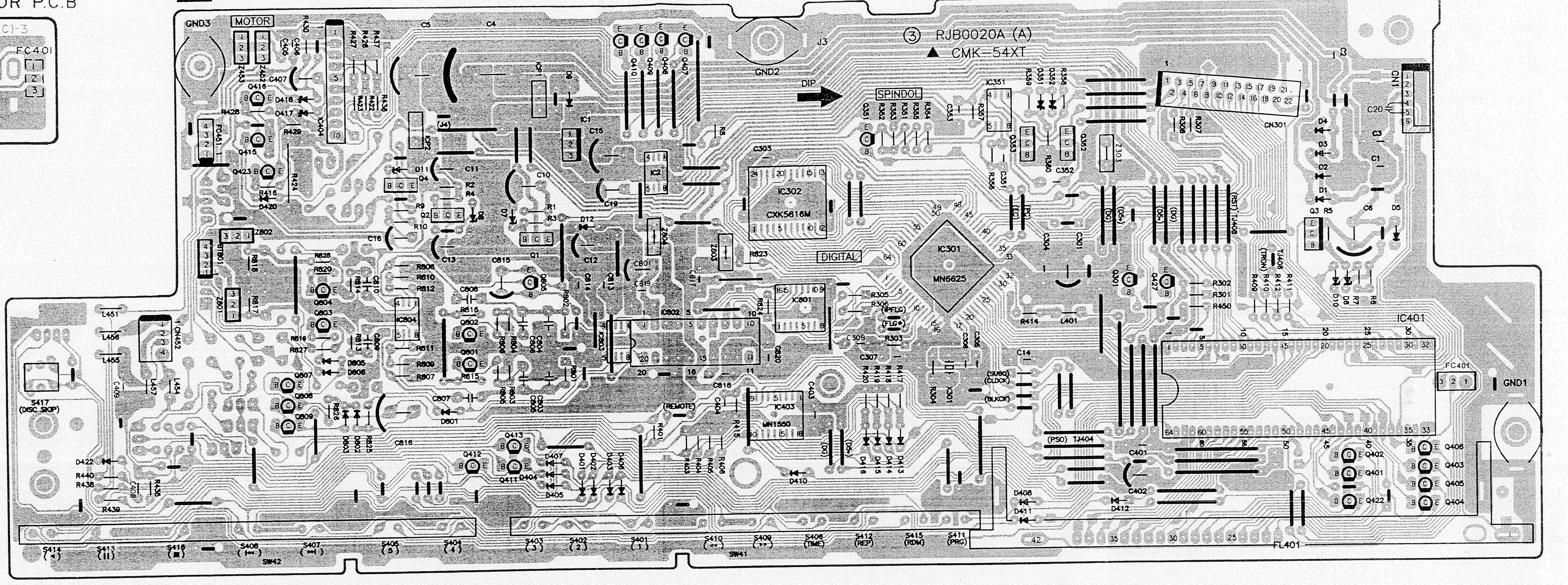

LINE OUT
(R ch)
(L ch)
CN801
JK801
① RJB0080A
▲ CMK-54XT

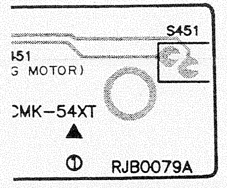

C149
C124
C122
C146
R125
R108
C119
C148
R118
Q102
E C B
C145
R114
R113
C128
M
SPINDLE MOTOR

## C REMOTE SENSOR P.C.B

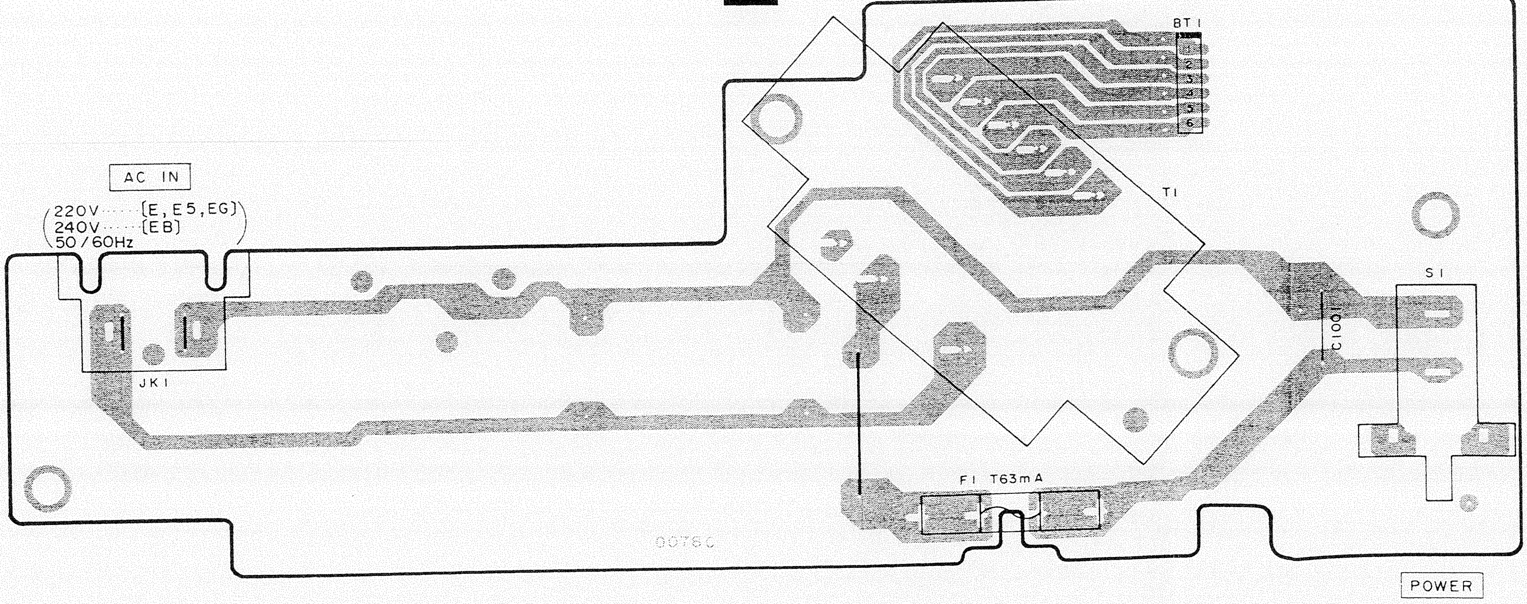

RJB0020A(C)-3
FC401
1 2 3
IC601
REMOTE SENSOR

## B MAIN P.C.B.

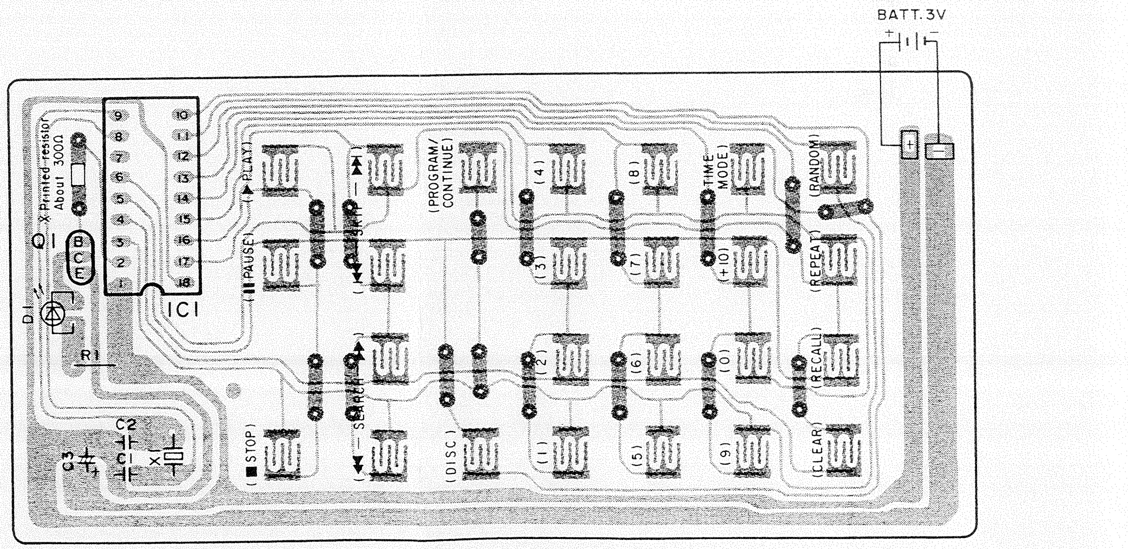

GND3
MOTOR
C5
C4
J3
GND2
③ RJB0020A (A)
▲ CMK-54XT
DIP
SPINDOL
IC351
CN301
CN1
C20
D4
D3
D2
D1
D5
Q3
R5
IC1
IC2
C15
C19
C10
C11
C12
C13
C16
Q1
Q2
Q4
D11
D12
J4
IC302
CXK5616M
IC301
MN6625
DIGITAL
IC801
IC802
IC403
MN1550
IC401
FC401
GND1
REMOTE
FLG
(SUBQ)
(BLKCK)
(PSO) TJ404
L401
C401
C402
S417 (DISC SKIP)
S414
S413
S416
S406
S407
S405
S404
S403
S402
S401
S410
S409
S408 (TIME)
S412 (REP)
S415 (RDM)
S411 (PRG)
SW42
SW41
FL401
Q401
Q402
Q403
Q404
Q405
Q406
Q422
Q412
Q413
Q411
Q415
Q416
Q417
Q423
D410
D411
D412
D408


S451
451
G MOTOR)
CMK-54XT
▲
① RJB0079A

## F POWER SUPPLY P.C.B.


BT1
T1
AC IN
220V ······ (E, E5, EG)
240V ······ (EB)
50 / 60Hz
JK1
S1
C100
F1 T63mA
POWER

- **Remote-control transmitter (EUR64789B)**


BATT. 3V
※Printed resistor About 300Ω
Q1
B C E
D1
R1
IC1
C1
C2
C3
X
(▶PLAY)
(❚❚PAUSE)
(■STOP)
(PROGRAM/CONTINUE)
(DISC)
(4)
(3)
(2)
(1)
(8)
(7)
(6)
(5)
(TIME MODE)
(+10)
(0)
(9)
(RANDOM)
(REPEAT)
(RECALL)
(CLEAR)

# REPLACEMENT PARTS LIST

Notes :
- Important safety notice:
  Components identified by ⚠ mark have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.
- The parenthesized indications in the Remarks columns specify the areas. (Refer to the cover page for area.)
  Parts without these indications can be used for all areas.

| Ref. No. | Part No. | Part Name & Description | Remarks |
|---|---|---|---|
| | | | |
| | | INTEGRATED CIRCUIT(S) | |
| | | | |
| IC1 | LM2940T5M | IC, REGULATOR | |
| IC2 | M51953BFPTA | IC, REGULATOR | |
| IC301 | MN6625 | IC, DIGITAL SIGNAL PROCESS- | |
| | | ING | |
| IC302 | CXK5816M | IC, 16K RAM | |
| IC351 | BA4558FT1 | IC, MOTOR DRIVE | |
| IC401 | MN15283PJL | IC, SYSTEM CONTROL | |
| IC403 | MN1550PEB | IC, REMOTE CONTROL | |
| | | DATA PROCESSING | |
| IC404 | BA6247N | IC, MOTOR DRIVE | |
| IC601 | HC-MD10E | IC, REMOTE CONTROL RECEIVER | |
| IC801 | SM5807ESET | IC, DIGITAL FILTER | |
| IC802 | LC7881B | IC, D/A CONVERTER | |
| IC803 | BA4558FT1 | IC, L. P. F. | |
| IC804 | BA4558FT1 | IC, BUFFER AMP | |
| ICP1 | SRUF15 | IC, PROTECTOR | ⚠ |
| ICP2 | SRUF15 | IC, PROTECTOR | ⚠ |
| | | | |
| | | TRANSISTOR(S) | |
| | | | |
| Q1 | 2SD1862QRTV6 | TRANSISTOR | |
| Q2 | 2SB1240QRTV6 | TRANSISTOR | |
| Q3 | 2SB1238QSTV6 | TRANSISTOR | |
| Q4 | 2SD1862QRTV6 | TRANSISTOR | |
| Q301 | UN4212TA | TRANSISTOR | |
| Q351 | UN4112TA | TRANSISTOR | |
| Q352 | 2SD1862QRTV6 | TRANSISTOR | |
| Q353 | 2SB1240QRTV6 | TRANSISTOR | |
| Q401 | UN4212TA | TRANSISTOR | |
| Q402 | UN4212TA | TRANSISTOR | |
| Q403 | UN4212TA | TRANSISTOR | |
| Q404 | UN4212TA | TRANSISTOR | |
| Q405 | UN4212TA | TRANSISTOR | |
| Q406 | UN4212TA | TRANSISTOR | |
| Q407 | UN4112TA | TRANSISTOR | |
| Q408 | UN4112TA | TRANSISTOR | |
| Q409 | UN4112TA | TRANSISTOR | |
| Q410 | UN4112TA | TRANSISTOR | |
| Q411 | 2SA1309QRSTA | TRANSISTOR | |
| Q412 | 2SA1309QRSTA | TRANSISTOR | |
| Q413 | 2SA1309QRSTA | TRANSISTOR | |
| Q415 | UN4212TA | TRANSISTOR | |
| Q416 | UN4212TA | TRANSISTOR | |
| Q422 | UN4212TA | TRANSISTOR | |

| Ref. No. | Part No. | Part Name & Description | Remarks |
|---|---|---|---|
| Q423 | 2SA1309QRSTA | TRANSISTOR | |
| Q427 | UN4112TA | TRANSISTOR | |
| Q801 | 2SC3311QRSTA | TRANSISTOR | |
| Q802 | 2SC3311QRSTA | TRANSISTOR | |
| Q803 | 2SD1450RSTTA | TRANSISTOR | |
| Q804 | 2SD1450RSTTA | TRANSISTOR | |
| Q805 | UN4112TA | TRANSISTOR | |
| Q807 | UN4112TA | TRANSISTOR | |
| Q808 | UN4212TA | TRANSISTOR | |
| Q809 | UN4112TA | TRANSISTOR | |
| | | | |
| | | DIODE(S) | |
| | | | |
| D1 | SVD1SR35200V | DIODE | ⚠ |
| D2 | SVD1SR35200V | DIODE | ⚠ |
| D3 | SVD1SR35200V | DIODE | ⚠ |
| D4 | SVD1SR35200V | DIODE | ⚠ |
| D5 | SVD1SR35200V | DIODE | ⚠ |
| D6 | MA4270MTA | DIODE | |
| D7 | MA4068MTA | DIODE | |
| D8 | MA4068MTA | DIODE | |
| D9 | SVD1SR35200V | DIODE | ⚠ |
| D10 | MA4062MTA | DIODE | |
| D11 | MA4180MTA | DIODE | |
| D12 | MA723TA | DIODE | |
| D351 | MA4051MTA | DIODE | |
| D352 | MA4051MTA | DIODE | |
| D401 | MA165TA | DIODE | |
| D402 | MA165TA | DIODE | |
| D403 | MA165TA | DIODE | |
| D404 | MA165TA | DIODE | |
| D405 | MA165TA | DIODE | |
| D406 | MA165TA | DIODE | |
| D407 | MA165TA | DIODE | |
| D408 | MA165TA | DIODE | |
| D410 | MA165TA | DIODE | |
| D411 | MA165TA | DIODE | |
| D412 | MA165TA | DIODE | |
| D413 | MA165TA | DIODE | |
| D414 | MA165TA | DIODE | |
| D415 | MA165TA | DIODE | |
| D416 | MA165TA | DIODE | |
| D417 | MA4030MTA | DIODE | |
| D418 | MA4033MTA | DIODE | |
| D420 | MA165TA | DIODE | |
| D422 | MA165TA | DIODE | |
| D451 | SVDGP1S53 | DIODE | |

| Ref. No. | Part No. | Part Name & Description | Remarks |
|---|---|---|---|
| D452 | SVDGP1S53 | DIODE | |
| D801 | MA165TA | DIODE | |
| D802 | MA165TA | DIODE | |
| D803 | MA165TA | DIODE | |
| D805 | MA165TA | DIODE | |
| D806 | MA165TA | DIODE | |
| | | | |
| | | COMPONENT COMBINATION(S) | |
| | | | |
| Z303 | EXCELDR35V | COMBINATION PART | |
| Z452 | DSS30654E222 | COMBINATION PART | |
| Z453 | DSS30654E222 | COMBINATION PART | |
| Z801 | DSS30654B102 | COMBINATION PART | |
| Z802 | DSS30654B102 | COMBINATION PART | |
| Z803 | EXCELDR35V | COMBINATION PART | |
| Z804 | EXCELDR35V | COMBINATION PART | |
| | | | |
| | | COIL(S) | |
| | | | |
| L401 | ELEPK3R3KA | COIL | |
| L451 | ELEPK3R3KA | COIL | |
| L454 | ELEPK3R3KA | COIL | |
| L455 | ELEPK3R3KA | COIL | |
| L456 | ELEPK3R3KA | COIL | |
| L457 | ELEPK3R3KA | COIL | |
| | | | |
| | | TRANSFORMERS | |
| | | | |
| T1 | RTP1K4E007-V | POWER TRANSFORMER | <E, E5, EG>⚠ |
| T1 | RTP1K4B006-V | POWER TRANSFORMER | <EB>⚠ |
| | | | |
| | | OSCILLATOR | |
| | | | |
| X301 | SVQAT1693ATA | OSCILLATOR | |
| | | | |
| | | DISPLAY TUBE | |
| | | | |
| FL401 | RSL0007F | DISPLAY TUBE | |
| | | | |
| | | SWITCH(ES) | |
| | | | |
| S1 | ESB8249V | SW, POWER | ⚠ |
| S417 | EVQQTG05R | SW, DISC SKIP | |
| S451 | SSPD12 | SW, CLAMP | |
| SW41 | RMN0010 | SWITCH, BLOCK(9) | |
| SW42 | RMN0011 | SWITCH, BLOCK(7) | |
| | | | |
| | | CONNECTORS | |
| | | | |
| CN1 | SJTD614 | CONNECTOR(6P) | |
| CN301 | SJSD2225 | CONNECTOR(22P) | |
| CN451 | SJTD414-W | CONNECTOR(4P) | |

| Ref. No. | Part No. | Part Name & Description | Remarks |
|---|---|---|---|
| CN452 | SJSD0405 | CONNECTOR(4P) | |
| CN801 | SJTD414-W | CONNECTOR(4P) | |
| | | | |
| | | CABLES | |
| | | | |
| BT1 | REX0027 | FLAT CABLE | |
| BT801 | REX0070 | SOCKET(4P) | |
| FC401 | REZ0013 | FLAT CABLE | |
| FC451 | REX0029 | FLAT CABLE | |
| FC452 | REZ0011 | FLAT CABLE | |
| | | | |
| | | | |
| | | FL HOLDER | |
| | | | |
| K401 | RMN0014 | FL HOLDER | |
| | | | |
| | | FUSE | |
| | | | |
| F1 | XBA2C006TB0 | FUSE | ⚠ |
| | | | |
| | | JACKS | |
| | | | |
| JK1 | SJS9236 | AC INLET | ⚠ |
| JK801 | SJFD4 | LINE OUT | |
| | | | |
| | | <SERVO P. C. B> | |
| | | INTEGRATED CIRCUITS | |
| | | | |
| IC101 | AN8373S | IC, SERVO AMP | |
| IC102 | AN8374S | IC, SERVO PROCESSOR | |
| IC103 | AN8377N | IC, B. T. L DRIVE | |
| | | | |
| | | <SERVO P. C. B> | |
| | | TRANSISTORS | |
| | | | |
| Q101 | 2SA1547QSTV2 | TRANSISTOR | |
| Q102 | 2SB1240QRTV6 | TRANSISTOR | |
| | | | |
| | | <SERVO P. C. B> | |
| | | VARIABLE RESISTORS | |
| | | | |
| VR101 | EVND3AA00B14 | V. R, BEST EYE ADJ. | |
| VR102 | EVND3AA00B14 | V. R, TRACKING GAIN ADJ. | |
| VR103 | EVND3AA00B14 | V. R, TRACKING OFFSET ADJ. | |
| VR104 | EVND3AA00B14 | V. R, FOCUS GAIN ADJ. | |
| VR105 | EVND3AA00B14 | V. R, FOCUS OFFSET ADJ. | |
| VR106 | EVND3AA00B24 | V. R, TRACKING BALANCE ADJ. | |
| | | | |
| | | <SERVO P. C. B> | |
| | | MAGNET RESISTOR ELEMENTS | |
| | | | |
| RA1 | EWS7M0A00Q53 | RESISTANCE UNIT | |

Notes : • Important safety notice:
Components identified by ⚠ mark have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.
• The parenthesized indications in the Remarks columns specify the areas. (Refer to the cover page for area.)
Parts without these indications can be used for all areas.
• *Remote Control Ass'y:*
Supply period for three years from termination of production.
• **Warning:** This product uses a laser diode. Refer to caution statements on page 3.
• **ACHTUNG:** Die lasereinheit nicht zerlegen.
Die lasereinheit darf nut gegen eine vom hersteller spezifizierte einheit ausgetauscht werden.

| Ref. No. | Part No. | Part Name & Description | Remarks |
|---|---|---|---|
| | | CABINET AND CHASSIS | |
| 1 | RKC0002 | HINGE | |
| 4 | REZ0057 | FLAT CABLE (22P) | |
| 5 | RGK0060 | ORNAMENT | |
| 6 | RGQ0012 | COVER | |
| 7 | RGT0001 | TRAY | |
| 8 | RGU0030 | BUTTON, POWER | |
| 9 | RGU0071-2 | BUTTON, MAIN | |
| 10 | RGU0072 | BUTTON, SUB | |
| 11 | RGU0073 | BUTTON, SKIP | |
| 12 | RFKKLPC20E-K | CABINET ASS'Y | (E) |
| 12 | RFKKLPC20E5-K | CABINET ASS'Y | (E5) |
| 12 | RFKKLPC20EB-K | CABINET ASS'Y | (EB) |
| 12 | RFKKLPC20EG-K | CABINET ASS'Y | (EG) |
| 13 | RXL0008 | LEVER ASS'Y | |
| 14 | RMA0060-1 | PLATE | |
| 15 | RMA0061 | PLATE | |
| 16 | RMA0062 | ANGLE | |
| 17 | RME0027 | SPRING | |
| 18 | RME0028 | SPRING | |
| 19 | RML0048-1 | LOCK LEVER | |
| 20 | RMM0015 | ROD, POWER | |
| 21 | RMA0059 | LID | |
| 22 | RMR0098 | CLAMPER | |
| 23 | SOMD8 | MAGNET | |
| 24 | SOYD2 | YOKE | |
| 25 | RKU0004-2 | BOTTOM COVER | |
| 26 | RSC0031 | SHIELD PLATE | |
| 27 | SHG3020 | FOOT RUBBER | |
| 28 | RMS0043-1 | GUIDE SHAFT | |
| 29 | XUC3FY | E. RING | |
| 30 | RMB0037 | SPRING | |
| 31 | RMR0079-1 | SPACER | |
| 32 | SHGD153-1 | RUBBER | |
| 33 | SUSD136-1 | SPRING | |
| 34 | SUSD137-1 | SPRING | |
| 35 | SUSD145-1 | SPRING | |
| 36 | RMA0053 | ROLLER | |
| 37 | RMS0039 | SHAFT | |
| 39 | RMK0027 | PLATE | |
| 40 | SHGB26 | DUST COVER CUSHION | |
| 41 | MMNLPC10 | MOTOR ASS'Y (LOADING) | |
| 42 | RDG0020 | GEAR (PULLEY) | |
| 43 | RDG0035 | GEAR (MAIN) | |

| Ref. No. | Part No. | Part Name & Description | Remarks |
|---|---|---|---|
| 44 | RDG0037 | GEAR (DRIVE) | |
| 45 | RDK0004 | ELEVATOR RACK | |
| 46 | RDV0005-1 | BELT | |
| 47 | RMC0007 | SPRING | |
| 48 | RMG0052 | RUBBER T.T. SHAFT | |
| 49 | RMR0152 | COVER (PULLEY GEAR) | |
| 50 | RFKJLPC20E-K | MECH CHASSIS ASS'Y | |
| 51 | RXL0009 | PLATE ASS'Y (ROLL OVER) | |
| 51-1 | RDG0036 | GEAR | |
| 51-2 | RMB0036 | SPRING | |
| 52 | RMK0029-1 | HOLDER | |
| 53 | RML0044 | LEVER | |
| 55 | RMA0128 | ANGLE | |
| 56 | RYF0010-K | DUST COVER | |
| 57 | SFGZJ02N01 | RUBBER CUSHION | |
| 58 | RMG0053 | RUBBER | |
| 60 | RKQ0007 | COVER | |
| 61 | RKQ0008 | TRAY HOLDER | |
| 62 | SJT388 | FUSE HOLDER | |
| N1 | XTB3+10JFZ | SCREW | |
| N2 | XYN3+F8 | SCREW | |
| N3 | XTW3+8T | SCREW | |
| N4 | XTB3+8G | SCREW | |
| N5 | XTB3+8JFZ | SCREW | |
| N6 | RHD30004 | SCREW | |
| N7 | RHD30005 | SCREW | |
| N8 | XYN26+C6 | SCREW | |
| | | | |
| | | ACCESSORIES | |
| | | | |
| A1 | RQT0243-G | INSTRUCTION MANUAL | (E, E5) |
| A1 | RQT0244-E | INSTRUCTION MANUAL | (E, E5) |
| A1 | RQT0245-B | INSTRUCTION MANUAL | (EB) |
| A1 | RQT0246-D | INSTRUCTION MANUAL | (EG) |
| A2 | SJA187 | POWER CORD | (E, E5, EG) |
| A2 | SJA193 | POWER CORD | (EB) |
| A3 | SJP2249-3 | OUTPUT CORD | |
| A4 | RQCA0024 | CAUTION | |
| | | | |
| | | PACKING MATERIAL | |
| | | | |
| P1 | RPG0208 | PACKING CASE | |
| P2 | RPN0088A-1 | PAD (FRONT) | |

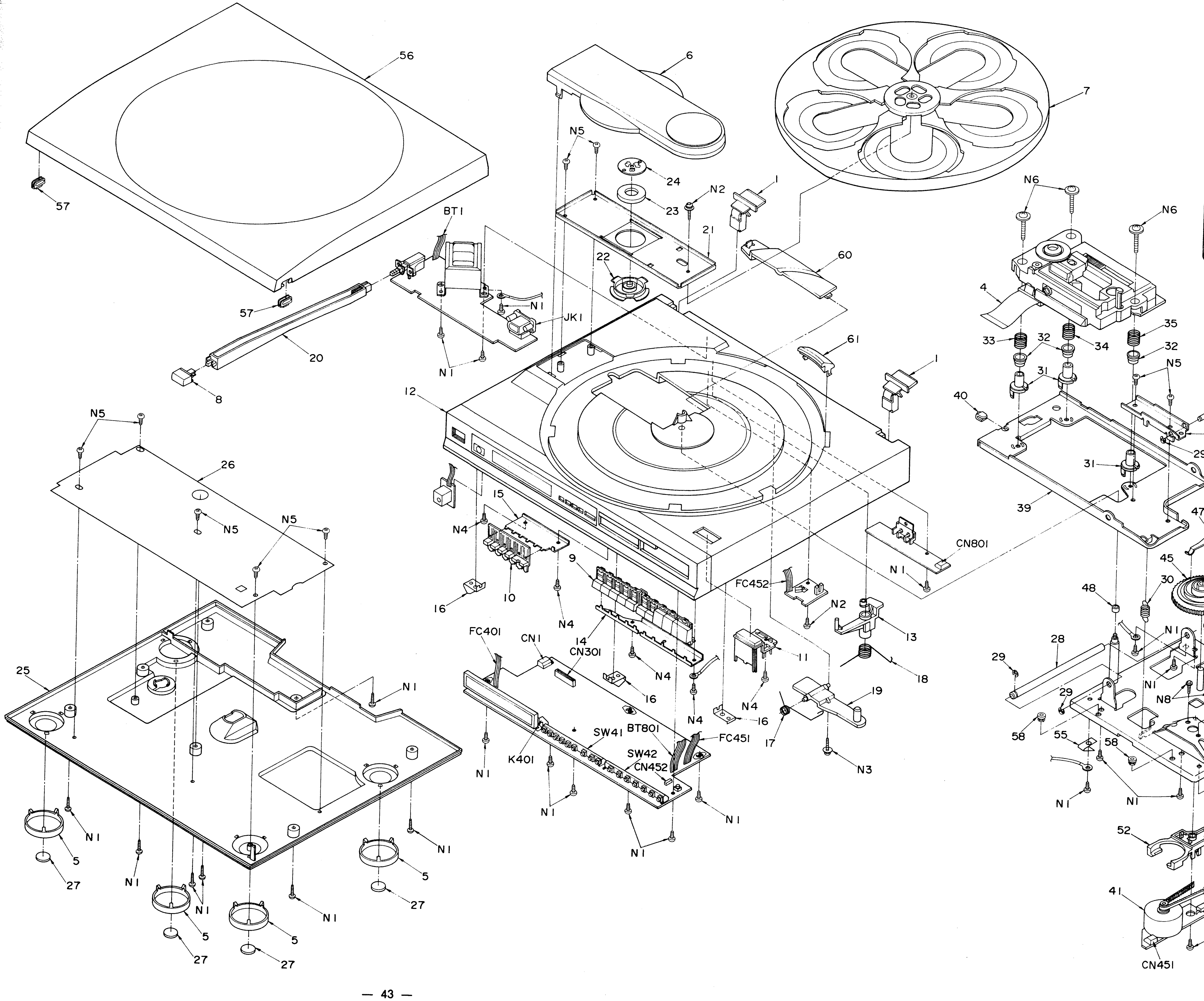
| Ref. No. | Part No. | Part Name & Description | Remarks |
|---|---|---|---|
| P3 | RPN0088B-1 | PAD (BACK) | |
| P4 | RPQ0017-3 | CLAMPER | |
| P5 | XZB60X60A01 | PROTECTION BAG (UNIT) | |
| P6 | XZB26X17C03 | PROTECTION BAG (CORD) | |
| P7 | RPF0024 | PROTECTION BAG (DUST COVER) | |
| | | | |
| | | CABINET <TRAVERSE DECK> | |
| | | | |
| 102 | SISD22-1 | TRAVERSE BASE | |
| 103 | SD0D28-1E | TURNTABLE | |
| 103-1 | XXE26D5 | SCREW | |
| 104 | SD0D29-2 | RING | |
| 106 | SRQA010N04 | SPRING | |
| 107 | S0RD37 | ROLLER | |
| 108 | S0RD38-E | COIL | |
| 109 | SUXD123-1 | GUIDE SHAFT | |
| 110 | S0AD70A | OPTICAL PICKUP | ⚠ |
| 111 | SHRD176-E | COIL HOLDER | |
| 113 | SHGD148 | STOPPER | |
| 114 | S0YD21-E | YOKE | |
| 115 | S0YD22 | YOKE | |
| 116 | SHRD177-1 | LOCK UNIT | |
| 117 | SHWD33 | WASHER | |
| 118 | SHWD34 | WASHER | |
| 119 | SNSD31 | SCREW | |
| 120 | XTN2+5G | SCREW | |
| 121 | XYN2+C8 | SCREW | |
| 129 | SUWD112 | GUIDE SHAFT HOLDER | |
| 134 | XTB3+10G | SCREW | |
| 149 | SJGDRF310T-2 | SPINDLE MOTOR | |
| 157 | SJSD1722M | SOCKET (17P) | |
| 158 | SJSD2222M | SOCKET (22P) | |
| 161 | EMCS0552MP | CONNECTOR (5P) | |
| | | | |
| | | | |
| | | REMOTE CONTROL UNIT | |
| | | | |
| RC1 | EUR64789B | REMOTE CONTROL ASS'Y | |
| | | | |
| | | INTEGRATED CIRCUIT | |
| | | | |
| IC1 | MN6014E | I.C, MICRO COMPUTER | |
| | | | |
| | | TRANSISTOR | |
| | | | |
| Q1 | 2SC2710Y | TRANSISTOR | |
| | | | |
| | | DIODE | |
| | | | |
| D1 | LN66 | L.E.D | |
| | | | |
| | | OSCILLATOR | |

| Ref. No. | Part No. | Part Name & Description | Remarks |
|---|---|---|---|
| | | | |
| X1 | CSB420PB6 | OSCILLATOR | |
| | | | |
| | | RESISTOR | |
| | | | |
| R1 | ERDS2TJ1R0A | RESISTOR 1 1/4W | |
| | | | |
| | | CAPACITORS | |
| | | | |
| C1.2 | ECKF1H471KB | CAPACITOR 100P 50V | |
| C3 | ECEA0GK101 | CAPACITOR 100U 4V | |
| | | | |
| | | MECHANISM PARTS | |
| | | | |
| 1 | UR64VCS818 | TOP COVER | |
| 2 | UR64CS803A | BOTTOM COVER | |
| 3 | UR64EC804 | BATTERY COVER | |
| 4 | UR64CT811D | BUTTON | |
| 5 | UR52SB327 | PLATE | |
| 6 | UR64TD374 | BATTERY TERMINAL (COMMON) | |
| 7 | UR64TD812 | BATTERY TERMINAL (+) | |
| 8 | UR64TD813 | BATTERY TERMINAL (-) | |

| Remarks |
|---|
| |

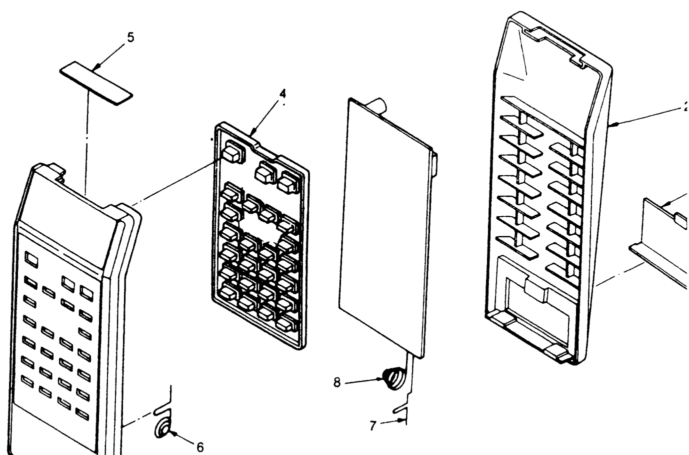
# EXPLODED VIEWS

- Cabinet and chassis parts

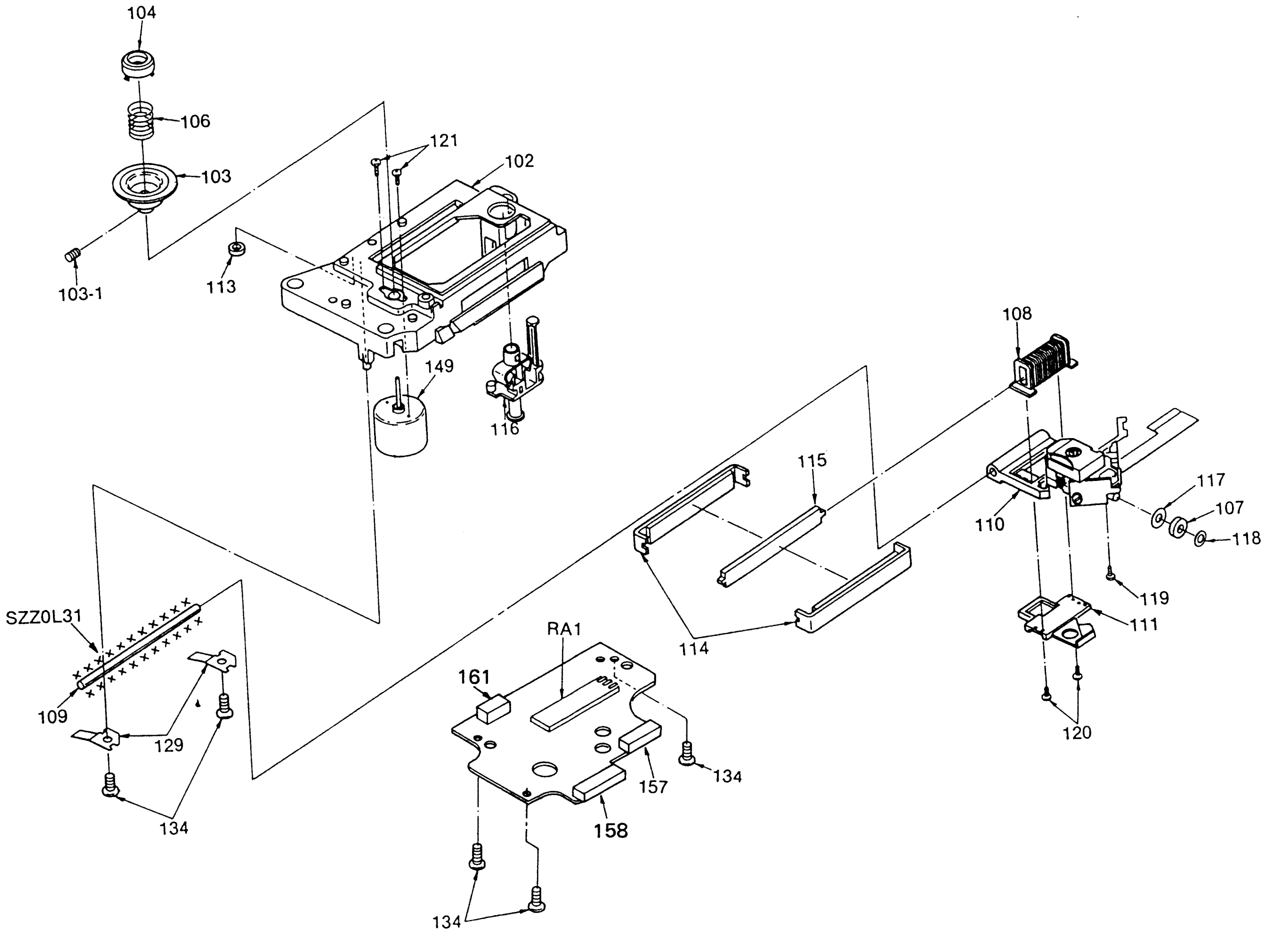


56
57
6
7
N5
24
23
N2
1
BT1
21
22
60
N1
JK1
20
8
N6
4
35
33
32
34
31
N5
37
40
36
29
43
39
31
29
51
47
29
49
N7
45
51-1
51-2
44
30
48
42
58
28
N1
58
29
N8
50
58
55
58
29
N1
N1
N1
52
53
46
41
N5
CN451
61
12
26
N5
N5
N5
15
N4
9
10
16
N4
14
CN301
CN1
FC401
N4
16
N1
25
FC452
N2
CN801
13
18
11
N4
16
19
17
N3
N4
BT801
FC451
SW41
SW42
CN452
K401
N1
N1
N1
N1
N1
5
27
N1
N1
5
27
N1
5
27
5
27

- Remote control transmitter (EUR64789B)

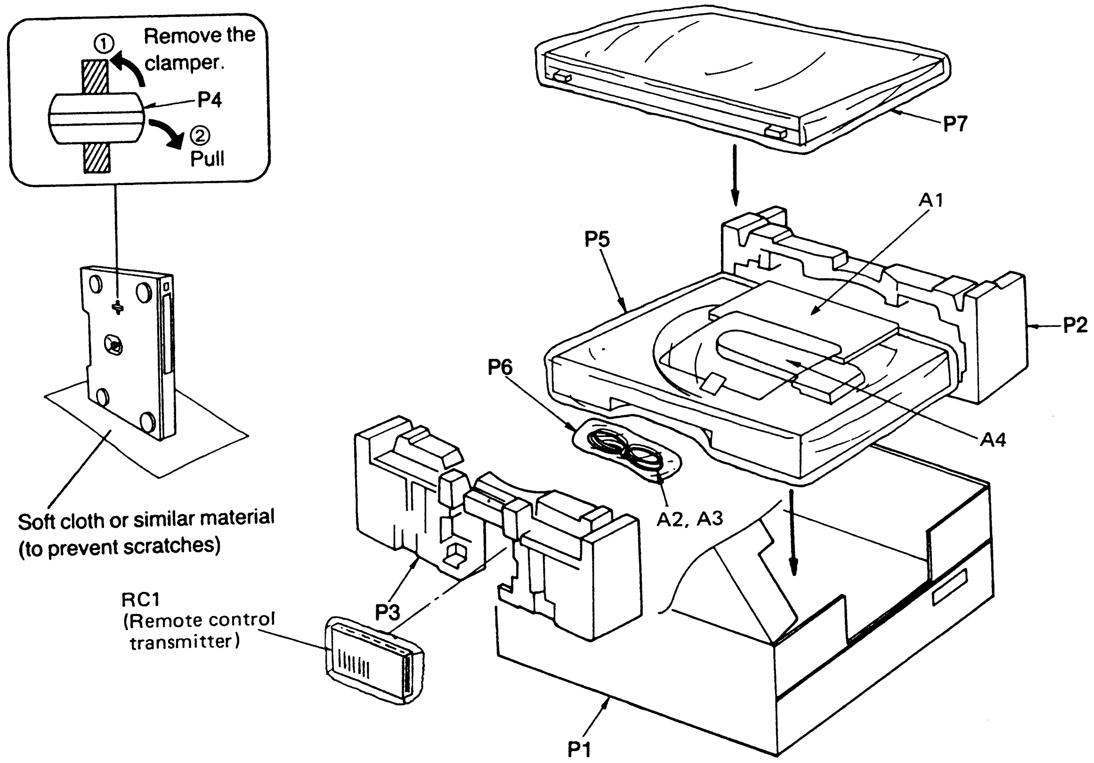


- **Traverse deck parts**


104
106
103
103-1
121
102
113
149
116
108
115
117
107
118
110
119
111
120
114
SZZ0L31
RA1
161
109
129
134
157
158
134

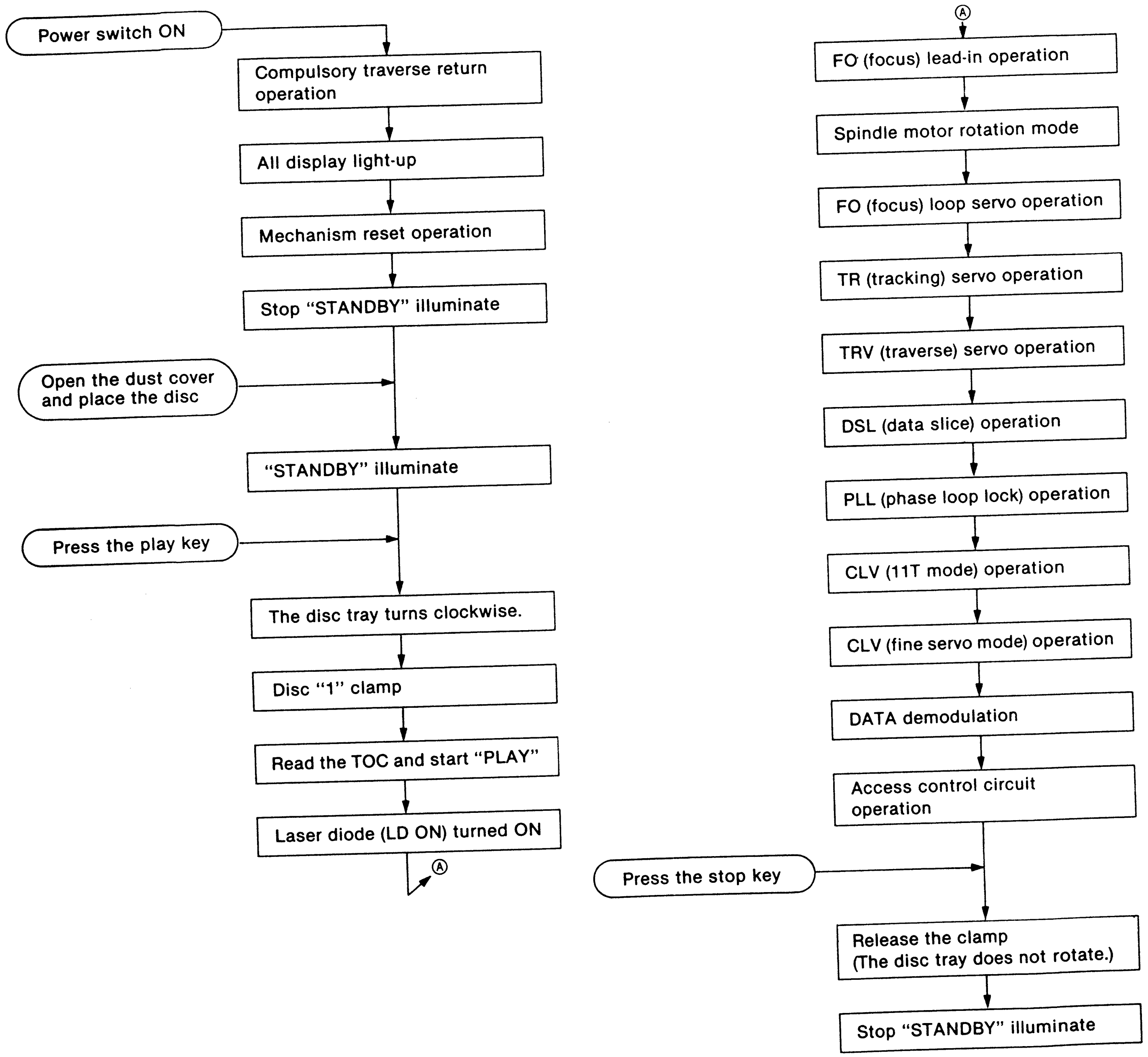
## ■ PACKING

**(Parts list on page 41, 42.)**


① Remove the clamper.
P4
② Pull
Soft cloth or similar material (to prevent scratches)
RC1 (Remote control transmitter)
P3
P1
P7
A1
P5
P2
P6
A4
A2, A3

## ■ TROUBLESHOOTING FLOW CHART

### PLAYBACK FLOW CHART


Power switch ON
Compulsory traverse return operation
All display light-up
Mechanism reset operation
Stop "STANDBY" illuminate
Open the dust cover and place the disc
"STANDBY" illuminate
Press the play key
The disc tray turns clockwise.
Disc "1" clamp
Read the TOC and start "PLAY"
Laser diode (LD ON) turned ON
Ⓐ
Ⓐ
FO (focus) lead-in operation
Spindle motor rotation mode
FO (focus) loop servo operation
TR (tracking) servo operation
TRV (traverse) servo operation
DSL (data slice) operation
PLL (phase loop lock) operation
CLV (11T mode) operation
CLV (fine servo mode) operation
DATA demodulation
Access control circuit operation
Press the stop key
Release the clamp (The disc tray does not rotate.)
Stop "STANDBY" illuminate

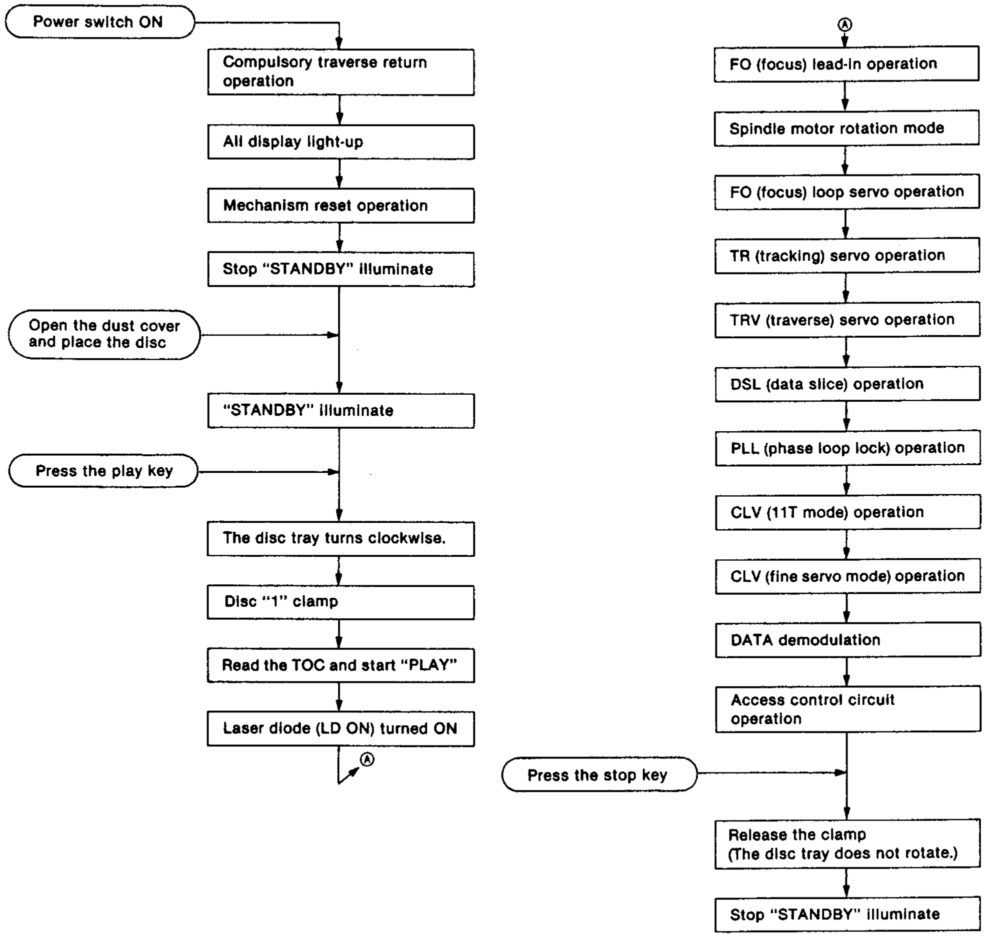
# RESISTORS & CAPACITORS

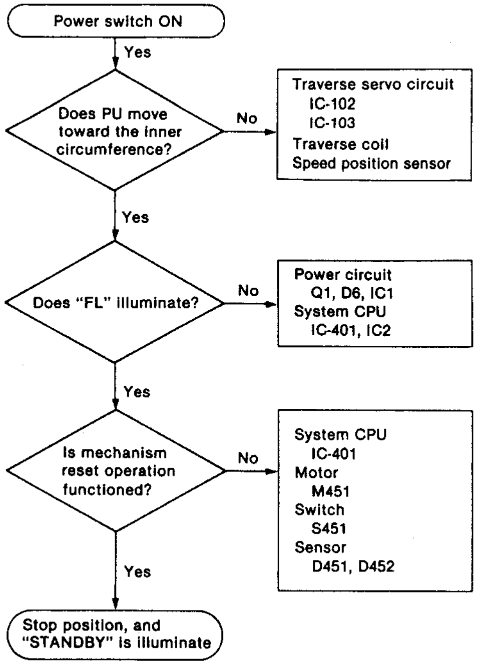
Notes : • Capacity valuse are in microfarads (uF) unless specified otherwise, P=Pico-farads (pF) F=Farads (F)
• *Resistance values are in ohms, unless specified otherwise, 1K=1,000 (OHM) , 1M=1,000k (OHM)*

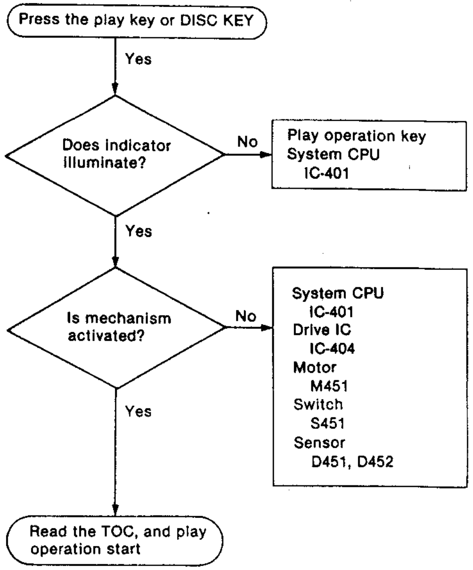
| Ref. No. | Part No. | Values & Remarks |
|---|---|---|
| | | RESISTORS |
| R1 | ERDS2TJ151T | 1/4W 150 |
| R2 | ERDS2TJ151T | 1/4W 150 |
| R3 | ERDS2TJ470T | 1/4W 47 |
| R4 | ERDS2TJ470T | 1/4W 47 |
| R5 | ERDS2TJ222T | 1/4W 2.2K |
| R6 | ERDS2TJ472T | 1/4W 4.7K |
| R7 | ERDS2TJ392T | 1/4W 3.9K |
| R8 | ERDS2TJ472T | 1/4W 4.7K |
| R9 | ERDS2TJ471T | 1/4W 470 |
| R10 | ERDS2TJ471T | 1/4W 470 |
| R301 | ERDS2TJ472T | 1/4W 4.7K |
| R302 | ERDS2TJ472T | 1/4W 4.7K |
| R303 | ERDS2TJ561T | 1/4W 560 |
| R304 | ERDS2TJ121T | 1/4W 120 |
| R305 | ERDS2TJ121T | 1/4W 120 |
| R306 | ERDS2TJ121T | 1/4W 120 |
| R307 | ERDS2TJ121T | 1/4W 120 |
| R308 | ERDS2TJ121T | 1/4W 120 |
| R351 | ERDS2TJ154T | 1/4W 150K |
| R352 | ERDS2TJ333T | 1/4W 33K |
| R353 | ERDS2TJ333T | 1/4W 33K |
| R354 | ERDS2TJ123T | 1/4W 12K |
| R355 | ERDS2TJ103T | 1/4W 10K |
| R356 | ERDS2TJ154T | 1/4W 150K |
| R357 | ERDS2TJ103T | 1/4W 10K |
| R358 | ERDS2TJ8R2T | 1/4W 8.2 |
| R359 | ERDS2TJ101T | 1/4W 100 |
| R360 | ERDS2TJ101T | 1/4W 100 |
| R401 | ERDS2TJ472T | 1/4W 4.7K |
| R403 | ERDS2TJ103T | 1/4W 10K |
| R404 | ERDS2TJ103T | 1/4W 10K |
| R405 | ERDS2TJ103T | 1/4W 10K |
| R406 | ERDS2TJ103T | 1/4W 10K |
| R409 | ERDS2TJ472T | 1/4W 4.7K |
| R410 | ERDS2TJ472T | 1/4W 4.7K |
| R411 | ERDS2TJ472T | 1/4W 4.7K |
| R412 | ERDS2TJ472T | 1/4W 4.7K |
| R414 | ERDS2TJ152T | 1/4W 1.5K |
| R415 | ERDS2TJ473T | 1/4W 47K |
| R416 | ERDS2TJ103T | 1/4W 10K |
| R417 | ERDS2TJ222T | 1/4W 2.2K |
| R418 | ERDS2TJ222T | 1/4W 2.2K |
| R419 | ERDS2TJ222T | 1/4W 2.2K |
| R420 | ERDS2TJ222T | 1/4W 2.2K |
| R422 | ERDS2TJ223T | 1/4W 22K |
| R423 | ERDS2TJ223T | 1/4W 22K |
| R424 | ERX1ANJ3R9H | 1W 3.9 |
| R426 | ERDS2TJ123T | 1/4W 12K |
| R427 | ERDS2TJ123T | 1/4W 12K |
| R428 | ERDS2TJ103T | 1/4W 10K |
| R429 | ERDS2TJ102T | 1/4W 1K |
| R430 | ERDS2TJ102T | 1/4W 1K |
| R435 | ERDS2TJ103T | 1/4W 10K |
| R436 | ERDS2TJ223T | 1/4W 22K |
| R437 | ERDS2TJ123T | 1/4W 12K |
| R438 | ERDS2TJ103T | 1/4W 10K |
| R439 | ERDS2TJ103T | 1/4W 10K |
| R440 | ERDS2TJ103T | 1/4W 10K |
| R441 | ERDS2TJ473T | 1/4W 47K |
| R442 | ERDS2TJ331T | 1/4W 330 |
| R450 | ERDS2TJ152T | 1/4W 1.5K |
| R452 | ERDS2TJ473T | 1/4W 47K |
| R453 | ERDS2TJ331T | 1/4W 330 |
| R801 | ERDS2TJ102T | 1/4W 1K |
| R802 | ERDS2TJ102T | 1/4W 1K |
| R803 | ERDS2TJ104T | 1/4W 100K |
| R804 | ERDS2TJ104T | 1/4W 100K |
| R805 | ERDS2TJ471T | 1/4W 470 |
| R806 | ERDS2TJ471T | 1/4W 470 |
| R807 | ERDS2TJ333T | 1/4W 33K |
| R808 | ERDS2TJ333T | 1/4W 33K |
| R809 | ERDS2TJ182T | 1/4W 1.8K |
| R810 | ERDS2TJ182T | 1/4W 1.8K |
| R811 | ERDS2TJ272T | 1/4W 2.7K |
| R812 | ERDS2TJ272T | 1/4W 2.7K |
| R813 | ERDS2TJ821T | 1/4W 820 |
| R814 | ERDS2TJ821T | 1/4W 820 |
| R815 | ERDS2TJ472T | 1/4W 4.7K |
| R816 | ERDS2TJ472T | 1/4W 4.7K |
| R817 | ERDS2TJ473T | 1/4W 47K |
| R818 | ERDS2TJ473T | 1/4W 47K |
| R819 | ERDS2TJ471T | 1/4W 470 |
| R820 | ERDS2TJ471T | 1/4W 470 |
| R823 | ERDS2TJ472T | 1/4W 4.7K |
| R824 | ERDS2TJ121T | 1/4W 120 |
| R825 | ERDS2TJ561T | 1/4W 560 |
| R826 | ERDS2TJ471T | 1/4W 470 |
| R827 | ERDS2TJ101T | 1/4W 100 |
| R828 | ERDS2TJ101T | 1/4W 100 |
| | | CAPACITORS |
| C1 | ECKR1H223ZF5 | 50V 0.022U ⚠ |
| C2 | ECKR1H223ZF5 | 50V 0.022U |
| C3 | ECKR1H223ZF5 | 50V 0.022U ⚠ |
| C4 | ECEA1CU332E | 16V 3300U |
| C5 | ECEA1CU222E | 16V 2200U |
| C6 | ECEA1JU470BV | 63V 47U |
| C10 | ECEA1AU471B | 10V 470U |
| C11 | ECEA1AU471B | 10V 470U |
| C12 | ECEA1AU101B | 10V 100U |
| C13 | ECEA1AU101B | 10V 100U |
| C14 | ECFR1E104ZF5 | 25V 0.1U |
| C15 | ECEA0JU221B | 6.3V 220U |
| C16 | ECEA1EU470B | 25V 47U |
| C19 | ECEA1HK0R1B | 50V 0.1U |
| C20 | ECFR1E104ZF5 | 25V 0.1U |
| C301 | ECEA0JU101B | 6.3V 100U |
| C303 | ECFR1E104ZF5 | 25V 0.1U |
| C304 | ECFR1E104ZF5 | 25V 0.1U |
| C305 | ECBT1H220J5 | 50V 22P |
| C306 | ECBT1H6R8K5 | 50V 6.8P |
| C307 | ECBT1H220J5 | 50V 22P |
| C308 | ECKR1H102KB5 | 50V 1000P |
| C351 | ECKR1H222KB5 | 50V 2200P |
| C352 | ECKR1H103ZF5 | 50V 0.01U |
| C353 | ECFR1E563MR | 25V 0.056U |
| C401 | ECFR1E104ZF5 | 25V 0.1U |
| C402 | ECEA0JK470B | 6.3V 47U |
| C403 | ECFR1E104ZF5 | 25V 0.1U |
| C404 | ECBT1H220J5 | 50V 22P |
| C405 | ECBT1E223ZF5 | 25V 0.022U |
| C406 | ECBT1E223ZF5 | 25V 0.022U |
| C407 | ECEA0JU101B | 6.3V 100U |
| C408 | ECFR1E104ZF5 | 25V 0.1U |
| C409 | ECFR1E104ZF5 | 25V 0.1U |
| C801 | ECEA0JU101B | 6.3V 100U |
| C803 | ECQM1H222KV3 | 50V 2200P |
| C804 | ECQM1H222KV3 | 50V 2200P |
| C805 | ECQM1H333KF3 | 50V 0.033U |
| C806 | ECQM1H333KF3 | 50V 0.033U |
| C807 | ECEA1CN100BV | 16V 10U |
| C808 | ECEA1CN100BV | 16V 10U |
| C809 | ECEA1CN100BV | 16V 10U |
| C810 | ECEA1CN100BV | 16V 10U |
| C813 | ECFR1E104ZF5 | 25V 0.1U |
| C814 | ECFR1E104ZF5 | 25V 0.1U |
| C815 | ECEA1HK010B | 50V 1U |
| C816 | ECEA0JU102B | 6.3V 1000U |
| C817 | ECFR1E104ZF5 | 25V 0.1U |
| C818 | ECFR1E104ZF5 | 25V 0.1U |
| C819 | ECFR1E104ZF5 | 25V 0.1U |
| C820 | ECFR1E104ZF5 | 25V 0.1U |
| C1001 | ECKDKC103PF2 | 400V 0.01U ⚠ |
| | | RESISTORS<SERVO P.C.B> |
| R101 | ERDS2TJ471 | 1/4 470 |
| R102 | ERJ6GEYJ120V | 1/10 12 |
| R103 | ERJ6GEYJ122 | 1/10 1.2K |
| R104 | ERJ6GEYJ471 | 1/10 470 |
| R105, 106 | RRJ6GCJ102TE | 1/6 1K |
| R108 | ERJ6GEYJ224V | 1/10 220K |
| R110 | ERDS2TJ222 | 1/4 2.2K |
| R111 | ERJ6GEYJ154V | 1/10 150K |
| R113 | ERJ6GEYJ472V | 1/10 4.7K |
| R114 | ERJ6GEYJ683V | 1/10 68K |
| R116 | ERJ6GEYJ332V | 1/10 3.3K |
| R117 | ERJ6GEYJ123 | 1/10 12K |
| R118 | ERJ6GEYJ333V | 1/10 33K |
| R119 | RRJ6GCJ223TE | 1/6 22K |
| R122 | ERDS2TJ104 | 1/4 100K |
| R123 | ERJ6GEYJ470V | 1/10 47 |
| R124 | RRJ6GCJ103TE | 1/6 10K |
| R125 | RRJ6GCJ222TE | 1/6 2.2K |
| R127 | ERDS2TJ681 | 1/4 680 |
| R128 | RRJ6GCJ103TE | 1/6 10K |
| | | CAPACITORS<SERVO P.C.B> |
| C101 | ECEA1CKS220I | 16V 22U |
| C102 | ECEA1HKS010I | 50V 1U |
| C103 | ECEA1CKS220I | 16V 22U |
| C106 | RCUV1E104ZF | 25V 0.1U |
| C107 | ECEA0GKS101I | 4V 100U |
| C108 | ECEA0JKS470I | 6.3V 47U |
| C109 | ECEA1HKS010I | 50V 1U |
| C110 | RCUV1H681KB | 50V 680P |
| C111 | ECUV1C224KR | 16V 0.22U |
| C112 | RCUV1H331KB | 50V 330P |
| C113 | ECEA1HSN010I | 50V 1U |
| C114 | RCUV1E333KB | 25V 0.033U |
| C115 | ECEA1HSN010I | 50V 1U |
| C116 | RCUV1E333KB | 25V 0.033U |
| C117 | ECBT1H102KB5 | 50V 0.001U |
| C119, 120 | ECEA1CKN4R7I | 16V 4.7U |
| C122 | ECEA0JKS220I | 6.3V 22U |
| C123 | RCUV1E104ZF | 25V 0.1U |
| C124 | ECUV1E823KB | 25V 0.082U |
| C125 | ECUV1C224KR | 16V 0.22U |
| C127 | ECEA0JKF101I | 6.3V 100U |
| C128 | ECEA1CKA101I | 16V 100U |
| C132 | ECUV1E104KB | 25V 0.1U |
| C133 | RCUV1H330KC | 50V 33P |
| C134, 135 | ECUV1C224KR | 16V 0.22U |
| C136 | ECEA0GKS101I | 4V 100U |
| C138 | RCUV1E104ZF | 25V 0.1U |
| C139 | RCUV1H470KC | 50V 47P |
| C140 | RCUV1E103KB | 25V 0.01U |
| C141-144 | RCUV1H470KC | 50V 47U |
| C145 | ECEA0JKF101I | 6.3V 100U |
| C146 | RCUVF1H181KC | 50V 180P |
| C147 | RCUV1H472KB | 50V 0.0047U |
| C148 | ECEA1ESN4R7I | 25V 4.7U |
| C149 | RCUV1E104ZF | 25V 0.1U |
| C150 | RCUV1E103KB | 25V 0.01U |

# TROUBLESHOOTING FLOW CHART

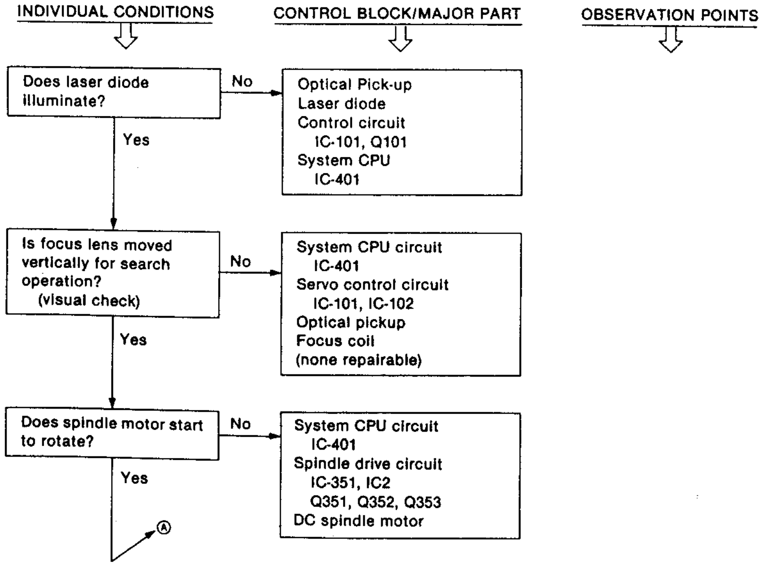
## PLAYBACK FLOW CHART

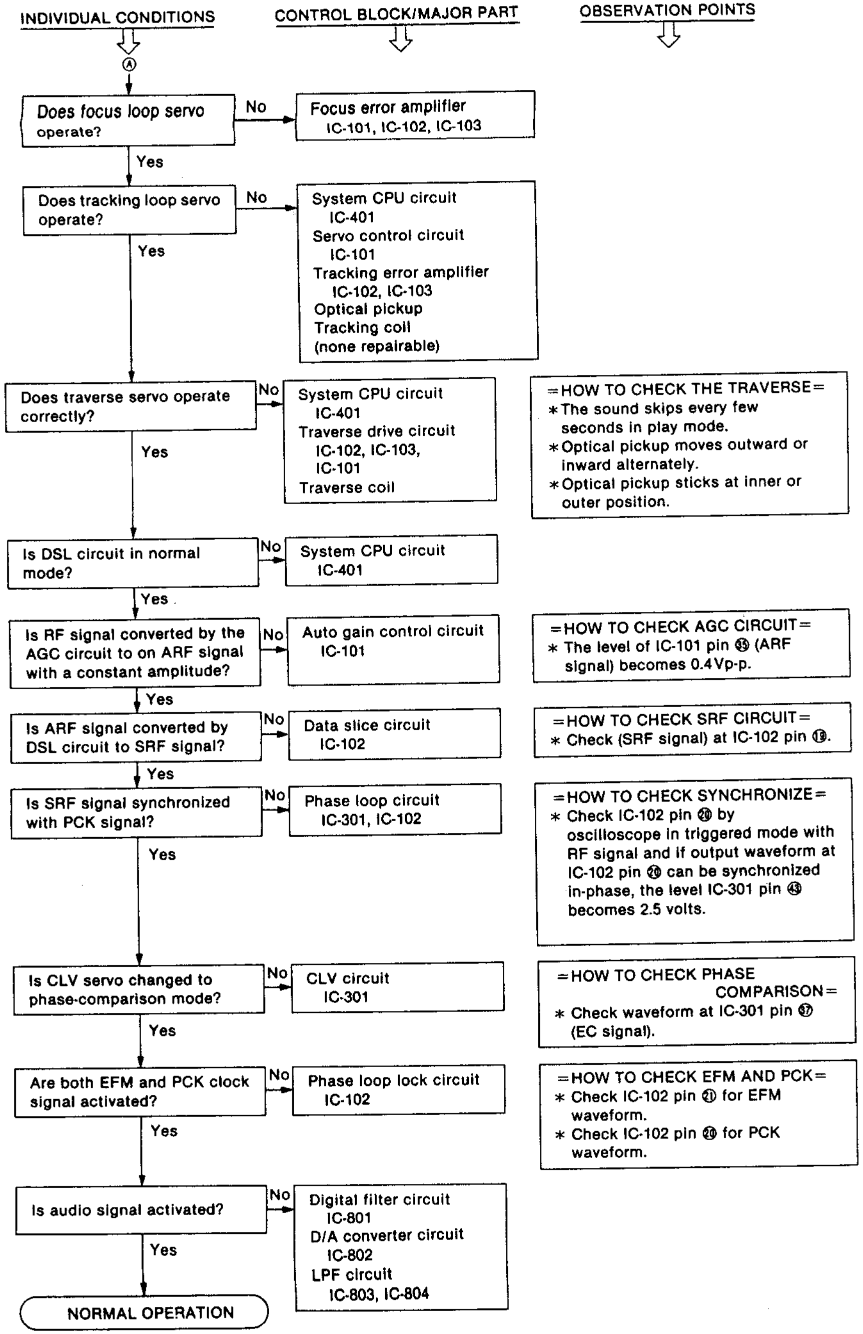

Power switch ON
Compulsory traverse return operation
All display light-up
Mechanism reset operation
Stop "STANDBY" illuminate
Open the dust cover and place the disc
"STANDBY" illuminate
Press the play key
The disc tray turns clockwise.
Disc "1" clamp
Read the TOC and start "PLAY"
Laser diode (LD ON) turned ON
Ⓐ
Ⓐ
FO (focus) lead-in operation
Spindle motor rotation mode
FO (focus) loop servo operation
TR (tracking) servo operation
TRV (traverse) servo operation
DSL (data slice) operation
PLL (phase loop lock) operation
CLV (11T mode) operation
CLV (fine servo mode) operation
DATA demodulation
Access control circuit operation
Press the stop key
Release the clamp
(The disc tray does not rotate.)
Stop "STANDBY" illuminate


Power switch ON
Yes
Does PU move toward the inner circumference?
No
Traverse servo circuit
IC-102
IC-103
Traverse coil
Speed position sensor
Yes
Does "FL" illuminate?
No
Power circuit
Q1, D6, IC1
System CPU
IC-401, IC2
Yes
Is mechanism reset operation functioned?
No
System CPU
IC-401
Motor
M451
Switch
S451
Sensor
D451, D452
Yes
Stop position, and "STANDBY" is illuminate


Press the play key or DISC KEY
Yes
Does indicator illuminate?
No
Play operation key
System CPU
IC-401
Yes
Is mechanism activated?
No
System CPU
IC-401
Drive IC
IC-404
Motor
M451
Switch
S451
Sensor
D451, D452
Yes
Read the TOC, and play operation start

## TOC READ OPERATION - PLAY OPERATION


INDIVIDUAL CONDITIONS
CONTROL BLOCK/MAJOR PART
OBSERVATION POINTS
Does laser diode illuminate?
No
Optical Pick-up
Laser diode
Control circuit
IC-101, Q101
System CPU
IC-401
Yes
Is focus lens moved vertically for search operation?
(visual check)
No
System CPU circuit
IC-401
Servo control circuit
IC-101, IC-102
Optical pickup
Focus coil
(none repairable)
Yes
Does spindle motor start to rotate?
No
System CPU circuit
IC-401
Spindle drive circuit
IC-351, IC2
Q351, Q352, Q353
DC spindle motor
Yes
Ⓐ



| INDIVIDUAL CONDITIONS | CONTROL BLOCK/MAJOR PART | OBSERVATION POINTS |
|---|---|---|
| Ⓐ Does focus loop servo operate? (No →; Yes ↓) | Focus error amplifier<br>IC-101, IC-102, IC-103 | |
| Does tracking loop servo operate? (No →; Yes ↓) | System CPU circuit<br>IC-401<br>Servo control circuit<br>IC-101<br>Tracking error amplifier<br>IC-102, IC-103<br>Optical pickup<br>Tracking coil<br>(none repairable) | |
| Does traverse servo operate correctly? (No →; Yes ↓) | System CPU circuit<br>IC-401<br>Traverse drive circuit<br>IC-102, IC-103,<br>IC-101<br>Traverse coil | =HOW TO CHECK THE TRAVERSE=<br>∗The sound skips every few seconds in play mode.<br>∗Optical pickup moves outward or inward alternately.<br>∗Optical pickup sticks at inner or outer position. |
| Is DSL circuit in normal mode? (No →; Yes ↓) | System CPU circuit<br>IC-401 | |
| Is RF signal converted by the AGC circuit to on ARF signal with a constant amplitude? (No →; Yes ↓) | Auto gain control circuit<br>IC-101 | =HOW TO CHECK AGC CIRCUIT=<br>∗ The level of IC-101 pin ㉟ (ARF signal) becomes 0.4Vp-p. |
| Is ARF signal converted by DSL circuit to SRF signal? (No →; Yes ↓) | Data slice circuit<br>IC-102 | =HOW TO CHECK SRF CIRCUIT=<br>∗ Check (SRF signal) at IC-102 pin ⑲. |
| Is SRF signal synchronized with PCK signal? (No →; Yes ↓) | Phase loop circuit<br>IC-301, IC-102 | =HOW TO CHECK SYNCHRONIZE=<br>∗ Check IC-102 pin ⑳ by oscilloscope in triggered mode with RF signal and if output waveform at IC-102 pin ⑳ can be synchronized in-phase, the level IC-301 pin ㊸ becomes 2.5 volts. |
| Is CLV servo changed to phase-comparison mode? (No →; Yes ↓) | CLV circuit<br>IC-301 | =HOW TO CHECK PHASE COMPARISON=<br>∗ Check waveform at IC-301 pin ㊲ (EC signal). |
| Are both EFM and PCK clock signal activated? (No →; Yes ↓) | Phase loop lock circuit<br>IC-102 | =HOW TO CHECK EFM AND PCK=<br>∗ Check IC-102 pin ㉑ for EFM waveform.<br>∗ Check IC-102 pin ⑳ for PCK waveform. |
| Is audio signal activated? (No →; Yes ↓) | Digital filter circuit<br>IC-801<br>D/A converter circuit<br>IC-802<br>LPF circuit<br>IC-803, IC-804 | |

NORMAL OPERATION

## TECHNICAL INFORMATION

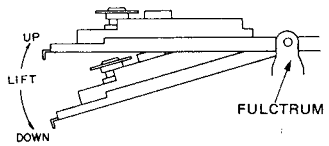
This recently developed five-disc changer, equipped with a carousel type mechanism, replaces the previous magazine type changer. The mechanism has been designed to provide quick disc access, including for three-inch CD's; allowing for disc replacement without music interruptions. This section will describe the mechanism's construction and its operation.

### 1. Mechanism operation

When the power is switched on, the mechanism will operate in the following order.

A) Power is switched on.

B) The traverse deck will lift up and then immediately descend. However, if the carousel has been turned by hand while the mechanism was stopped, the operation may advance directly from A) to C), depending on the position at which the carousel was stopped.



**Figure'1 Traverse Deck**

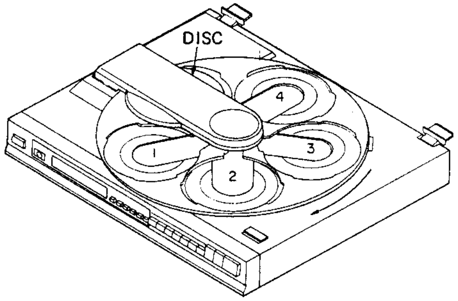


**Figure 2 Disc Tray Operation**

C) The carousel will begin turning (in the clockwise direction).

D) The No. 5 disc will come to the position of the traverse deck, and the carousel will stop turning.

No matter which position the carousel was originally stopped at, when the power is switched on, it will turn to this position (disc No. 5) and then stop (standby condition).

E) Continuous play

1) When the PLAY button is pressed, the carousel will turn in the clockwise direction.

2) When disc No. 1 comes to the traverse deck, the carousel will stop. The traverse deck will lift up, and play of disc No. 1 will begin.

3) When play of disc No.1 ends, the traverse deck will descend and the carousel will begin to turn toward disc No. 2.

4) The above operation will continue in order up to disc No. 5. After play of disc No. 5 ends, the traverse deck will descend and stop.

5) If a disc is not loaded on one of the trays, when that disc tray reaches the optical deck position, the deck assembly will still lift and search for the disc. After three search trials. If the disc is not detected, the traverse lowers and the carousel advances to the next disc position.

F) Programmed play

After steps A through D described above, play will be carried out in accordance with the programmed order.

G) Carousel lock

If the power is switched off while play is in progress, becaues the traverse deck will remain in the lifted up position, the carousel will lock and it will not be possible to turn the carousel by hand.

At the end of play or if play is stopped by the STOP button, the traverse deck will descend. Under this condition, or if the power is switched off this condition, it will be possible to turn the carousel by hand. (The carousel lock will be released when the traverse deck has lowered.)

## 2. Loading mechanism

The loading mechanism performs the following two functions.

A) Rotation of the carousel in order to carry the discs to the traverse deck (play position).

B) Lifting up of the traverse deck when a disc reaches the play position.

For these operations, the motor drive IC (IC-404) drives the loading motor (M451) in accordance with the signal from the system control IC-401, See figure 4.

The function of the loading motor (M451) is to rotates the carousel via intermediate gears or to lifts the traverse deck up or down via a cam block.

### 2-1 Rotation of the carousel (Refer to figure 4)

A) In order for the carousel to rotate, IC-404 supplies the motor (M451) with the proper voltage supply polarity, (pin 10 negative and pin 2 positive) in accordance with the signals from IC-401.

B) M451 turns in the counterclockwise direction, thus causing gears A and B to turn.

C) Gear B drives gear C so that it turns in the direction indicated by arrow C, thus causing gear C to shift in the direction indicated by arrow S and drive gear D, which in turn causes the carousel to rotate.

D) Gear C is mounted to a lever (refer to figure 3), and it shifts either in the direction indicated by arrow S or in the opposite direction, in accordance with the direction in which gear B is turning.

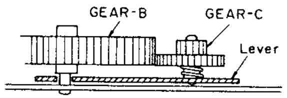


**Figure 3 Lever Position**

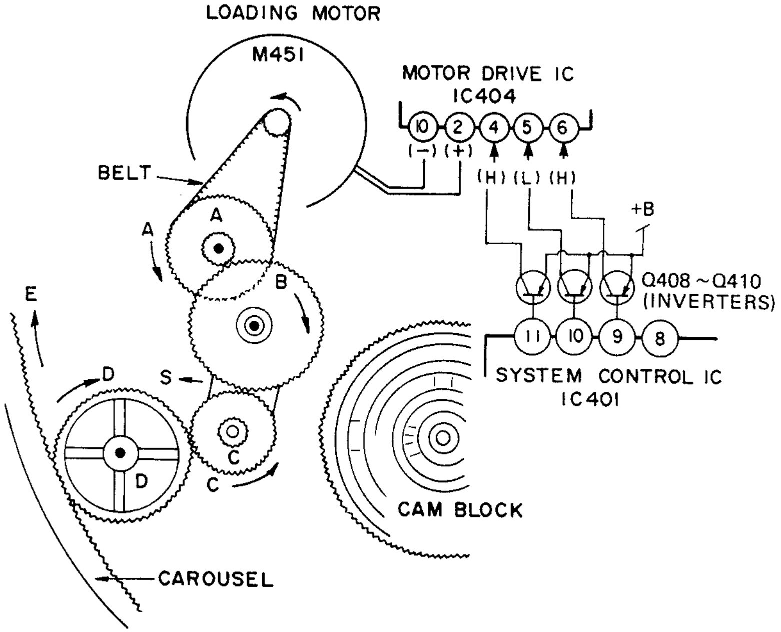


**Figure 4 Carousel Drive System**

## 2-2 **Lifting up and down of the traverse deck** (Refer to figure 5)

A) In order for the traverse deck to move up or down, IC-404 supplies the motor (M451) with the proper voltage supply polarity, (pin 10 positive and pin 2 negative) in accordance with the signals from IC-401.

B) M451 turns in the clockwise direction, and gear B drives gear C so that it turns in the direction indicated by arrow C, thus causing gear C to shift in the direction indicated by arrow T, causing the cam block to turn.

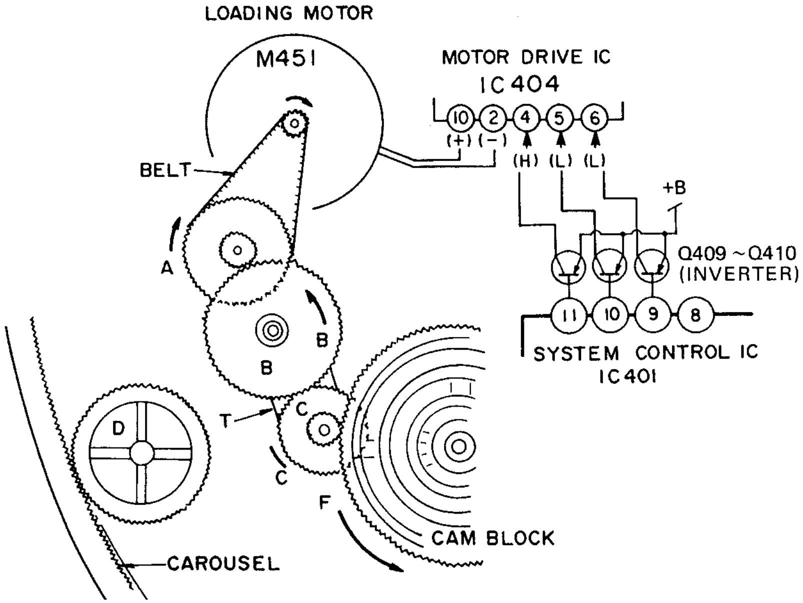

LOADING MOTOR
M451
MOTOR DRIVE IC
IC404
10
2
4
5
6
(+)
(−)
(H)
(L)
(L)
+B
BELT
A
B
B
T
C
C
D
F
Q409 ~ Q410
(INVERTER)
11
10
9
8
SYSTEM CONTROL IC
IC401
CAM BLOCK
CAROUSEL

**Figure 5 Traverse Up/Down Drive System**

C) The cam block turns in the direction indicated by arrow F, thus causing the traverse deck to lift up or down. (aarefer to figure 6).

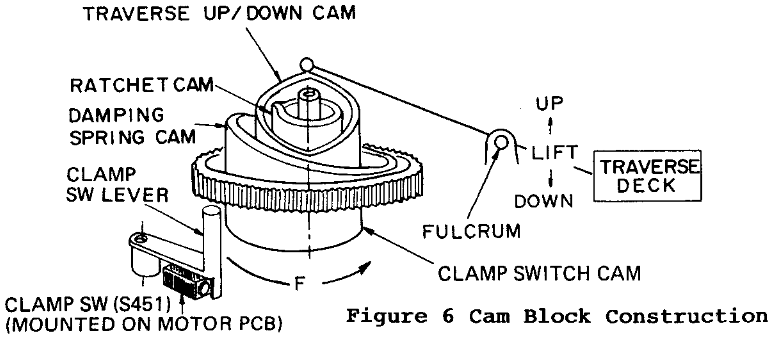

TRAVERSE UP/DOWN CAM
RATCHET CAM
DAMPING SPRING CAM
CLAMP SW LEVER
CLAMP SW (S451)
(MOUNTED ON MOTOR PCB)
F
FULCRUM
CLAMP SWITCH CAM
UP
LIFT
DOWN
TRAVERSE DECK

**Figure 6 Cam Block Construction**

D) Loading motor - Traverse deck truth table

The following truth table indicated the signals status relation between IC-401 (system control IC) and IC-404 (motor drive IC).

| MODE | Motor drive IC (IC-404) | | | | | | System contol (IC-401) | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Output | | | Input | | | Traverse Deck or Carousel | | | Speed |
| Pin | 10 | 2 | 3 | 4 | 5 | 6 | 11 | 10 | 9 | 8 |
| **Traverse deck up** | H | L | - | H | L | L | L | H | H | H/L |
| **Traverse deck down** | H | L | - | H | L | L | L | H | H | H/L |
| **Carousel rotation** | L | H | - | H | L | H | L | H | L | H/L |
| Stop/Play | L | L | - | L | L | L | H | H | H | H |

Speed
(H: Slow)
(L: High)

Note: The output of pin 8 of IC-401 is the command signal for changing the rotation speed of the loading motor, and the speed is increased when the signal is L; more details will be explained later.

### 3. **Disc number detection** (disc position sensor)

The disc number detection is controlled by IC-401 via the detection of a series of pulses generated by photocoupler D451 in conjunction with a series of shutters molded on the bottom of the carousel.

A) Carousel construction

Figure 7 shows the top view of the carousel indicating the positional relationships of the discs, interrupters, and photocoupler figure 8 is the bottom view.

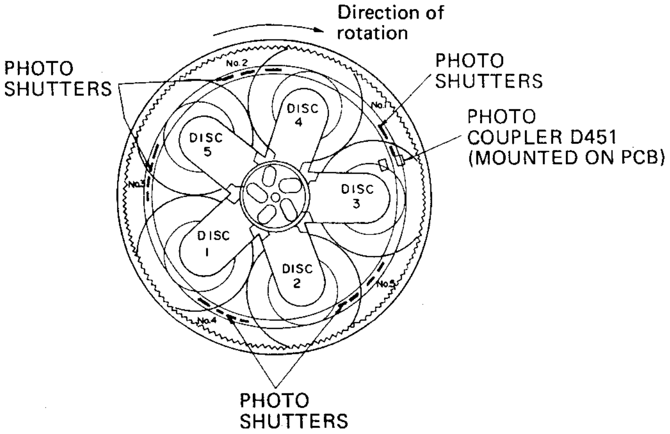

Direction of rotation
PHOTO SHUTTERS
PHOTO SHUTTERS
PHOTO COUPLER D451
(MOUNTED ON PCB)
DISC 1
DISC 2
DISC 3
DISC 4
DISC 5
No.1
No.2
No.3
No.4
No.5
PHOTO SHUTTERS

**Figure 7 Carousel Construction (Top view)**

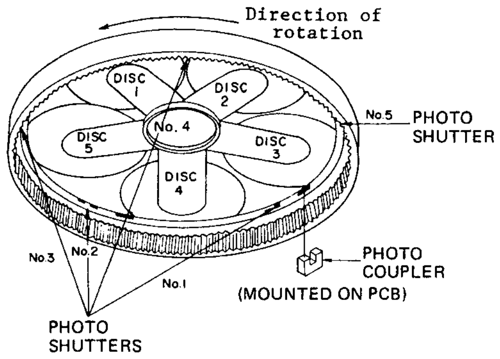

Direction of rotation
DISC 1
DISC 2
No. 4
DISC 5
DISC 3
DISC 4
No.5
PHOTO SHUTTER
No.3
No.2
No.1
PHOTO COUPLER
(MOUNTED ON PCB)
PHOTO SHUTTERS

**Figure 8 Carousel Construction (Bottom view)**

B) Detection circuit (Refer to figure 9)

When the carousel rotates, the pulse train shown in the figure 9 is generated at the photocoupler.

When the output signal is L, Q413 is switched ON and the signal from pin 38 of IC-401 is fed to pin 15.

The number of times which Q413 is switched ON/OFF (actually the falling edge of the signal) is counted, and IC-401 detects the disc number.

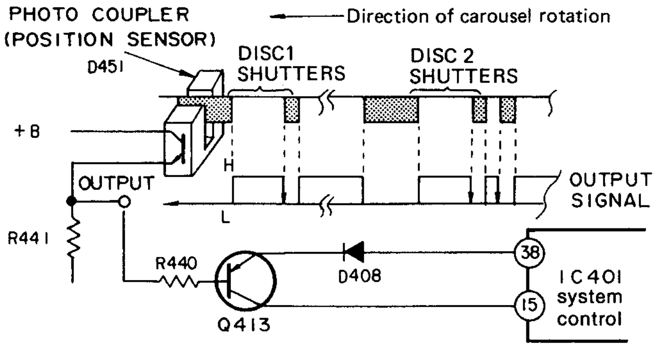


PHOTO COUPLER
(POSITION SENSOR)
D451
Direction of carousel rotation
DISC1 SHUTTERS
DISC 2 SHUTTERS
+B
OUTPUT
H
L
OUTPUT SIGNAL
R441
R440
D408
38
15
Q413
IC401 system control

**Figure 9 Pulse Generation and Detection**

### 4. Rest detection (rest sensor)

The rest position detection is controlled by IC-401 via the detection of pulses generated by photocoupler D452 in conjunction with a series of shutters molded on the bottom of the carousel.

As the carousel approaches its designated position, the loading motor's supply voltage decreases from 6.3 volts to 3.0 volts in order to slow down the carousel.

A) Rest position detection shutters (Refer to figure 10)

The rest detection shutters are located on the inner side of the disc detection shutters.

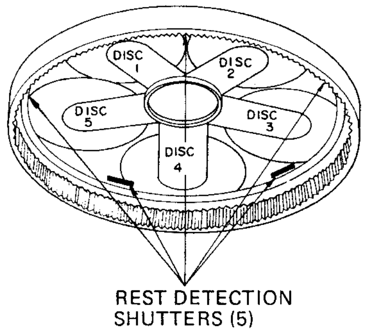

DISC 1
DISC 2
DISC 5
DISC 3
DISC 4
REST DETECTION SHUTTERS (5)

**Figure 10 Shutter's Location (Bottom view)**

B) Detection circuit (Refer to figure 11)

As the carousel rotates, the pulses shown in figure 11 are generated at the photocoupler.

The pulses cause Q411 to switch ON/OFF and the signal from pin 39 of IC-401 is fed to pin 15.

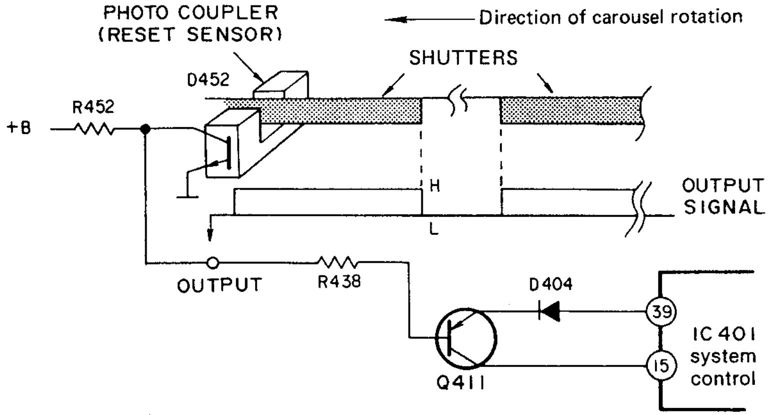


PHOTO COUPLER
(RESET SENSOR)
Direction of carousel rotation
SHUTTERS
D452
R452
+B
H
L
OUTPUT SIGNAL
OUTPUT
R438
D404
39
15
Q411
IC401 system control

**Figure 11 Rest Position Detection Circuit**

## 5. Clamp switch

This switch (S451) detect whether the traverse deck is at either the uppermost or lowermost position. It is operated by the cam located at the bottom of the cam block. (refer to figure 6).

The switch (S451) is ON when the deck isa its lowermost position.

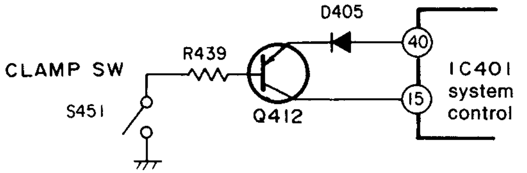


Figure 12 Traverse Deck Position Detection

## 6. Loading timing (Refer to figure 13)

A) Rotation of the carousel

1) When the PLAY button is pressed, pin 8 of IC-401 immediately outputs an H signal for 500 ms. (The H changes to L after 500 ms.)

2) This H signal causes a counterclockwise rotation voltage of 3 volts supplied from pins 2 (+) and 10 (-) of the motor drive IC-404 to the loading motor.

3) After 500 ms, the signal from pin 8 of IC-401 changes to L, thus causing the loading motors voltage described above the change to 6.3 volts.

The purpose of this operation is to provide a smooth start of the rotation of the carousel, followed by an increase in the rotation speed.

4) The rotation of the carousel causes the rest sensor to function. The generation of an H signal (at point A) causes IC-401 to perform the rest detection so that the signal output from pin 8 changes to H, and this signal causes the voltage being supplied to the motor to drop to 3 volts.

The purpose of this operation is to decrease the speed as the carousel approaches its destination to hssure smooth stop action.

During this time, pins 9 and 11 are L, and the motor turns in the counterclockwise direction. (Refer to the loading motor signal truth table page 55.)

The switching of the motor voltage from 3 volts to 6.3 volts will be explained later.

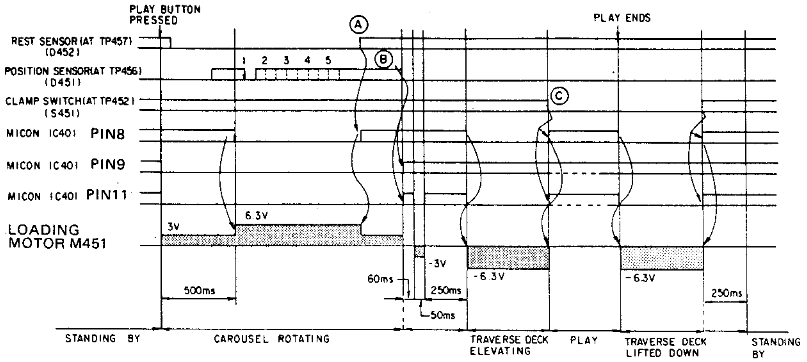


Figure 13 Timing Chart

B) Lifting up and down of the traverse deck

1) When the rotation of the carousel causes the position sensor signal (at TP456) to become L (point B), pins 9 and 11 of IC-401 simultaneously change to H. The voltage supply to the motor is not longer supplied, and the carousel stops.

2) Next, pin 11 outputs an L signal for a short period of time (approximately 50 ms), and the motor turns in the clockwise direction, at low speed thus causing gear C (refer to the loading mechanism section page 54) to become linked with the cam block.

3) After a 250 ms pause, pins 8 and 11 of IC-401 then change to L. The motor turns in the clockwise direction, and the lifting up of the traverse deck begins.

4) When the traverse deck reaches the uppermost position, the clamp switch (S451) turns off, and the output of pins 8 and 11 of IC-401 change to H (point C).

5) When play is finished:

   (a) During normal play, TOC is read at its starting of play, and IC-401 changes output at pins 8 and 11 of itself from H to L with detection of last music from TOC data.

   (b) During program (or random) play, IC-401 detects last music according to sequence of music programmed (or set random) then changes output at pin 8 and 11 from H to L.

6) Next, the motor turns (in the clockwise direction), thus turning the cam block, and the traverse deck begins to descend. When the traverse deck reaches the lowermost position, the clamp switch (S451) turns on.

7) The operation of the clamp switch causes the output of pins 8 and 11 of IC-401 to change to H, thus stopping the mechanism in a standby condition waiting for the next disc.

## 8. Loading motor drive circuit (Refer to figure 14)

A) Switching of the motor drive voltage (3 volts / 6.3 volts).

The motor drive voltage is 3 volts at the start and just before the end of the rotation of the carousel, and it is 6.3 volts during high speed rotation. The following is an explanation of this voltage switching.

1) Pin 8 of IC-401 is the input terminal controlling the motor drive voltage appearing at pins 2 and 10. The voltage at these two pins changes from 3 volts to 6.3 volts, in accordance with the control logic at pin 8.

2) At the start and just before the end of the rotation of the carousel, an H signal is output from pin 8 of IC-401, and Q407 is switched off.

3) The switching off of Q407 causes the bias voltage being applied to the base of Q415 to be discontinued, thus causing Q415 to be switched off.

4) The Q415 therefore causes Q416 to be switched on. The 3.3 volts zener diode D418 (for 3.3 volts) is short circuited, and the 3 volts drop across D417 (for 3 volts) is applied to pin 8 of IC-404.

5) When the L signal is output from pin 8 of IC-401, Q407 is switched on, a bias voltage is applied to the base of Q415 via D420, Q415 is switched on, and Q416 is switched off.

6) Thus, the combined voltage of D417 and D418 (6.3 volts) is applied to pin 8 of IC-404 so that the motor drive voltage becomes 6.3 volts, and the speed of the carousel is increased.

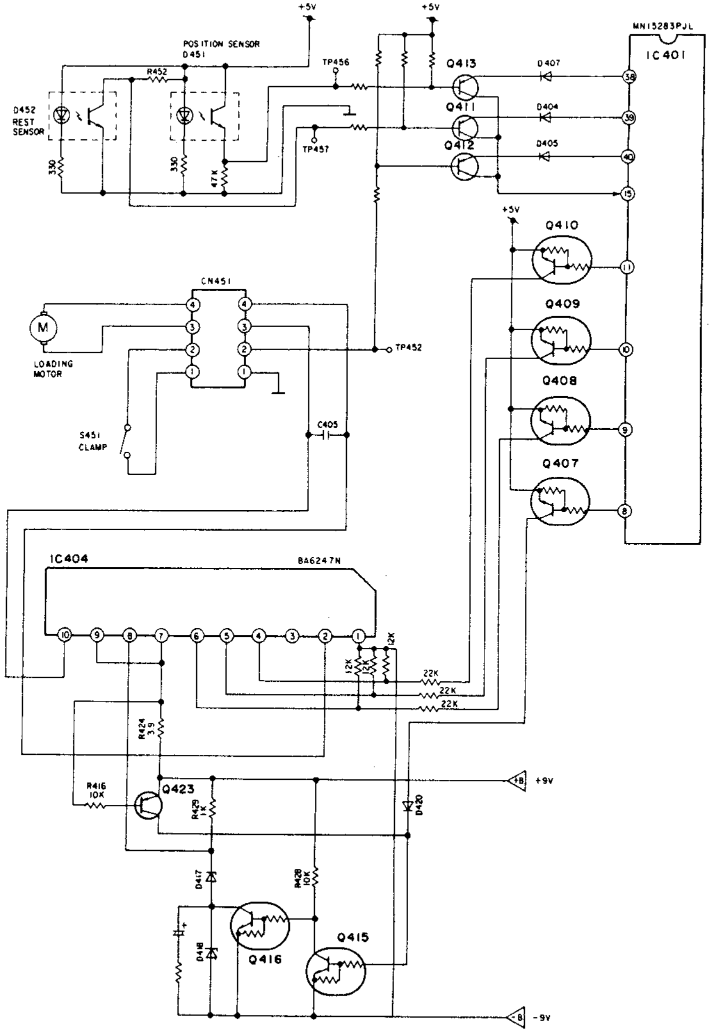

+5V
+5V
POSITION SENSOR
D451
R452
D452
REST
SENSOR
330
330
47K
TP456
TP457
Q413
Q411
Q412
D407
D404
D405
MN15283PJL
IC401
38
39
40
15
+5V
Q410
11
Q409
10
Q408
9
Q407
8
CN451
M
LOADING
MOTOR
TP452
S451
CLAMP
C405
IC404
BA6247N
10
9
8
7
6
5
4
3
2
1
12K
12K
12K
22K
22K
22K
R424
3.9
R416
10K
Q423
R425
1K
D420
+B
+9V
D417
R428
10K
D418
Q416
Q415
-B
-9V

Figure 14 Loading Motor Drive Circuit

B) Operation of pins 7 and 9 of IC-404

Pins 7 and 9 of IC-404 are the input terminals for the motor current control.

1) Purpose of Q423

When low speed rotation (low speed) of the carousel begins, if some external force makes it difficult to start rotation, Q423 functions as described below in order to change the voltage being supplied to the motor to 6.3 volts and thus provide increased torque.

6) N' 'olts are supplied to the motor for the low speed start ion, if some external force causes the motor load to , the current flowing through pins 7 and 9 of IC-404 .

SL-PC20

current increases, the voltage drop (equal to the age of Q423) across R424 increases, and Q423 is n.

..ne switching on of Q423 causes a bias voltage from the +9 volts source to be applied to Q415 via Q423, Q416 is switched off. The combined voltage of D417 and D418 (6.3 volts) is applied to pin 8 of IC-404, then IC-404 changes the voltage being supplied to the motor to 6.3 volts and the motor torque is increased.

## 9. Other functions of the cam block (Refer to figure 15)

In addition to the traverse deck up / down cam and clamp switch cam, the cam block also includes a ratchet cam and a damping spring cam.

A) Ratchet cam

The ratchet cam operates the ratchet in order to lock the carousel and prevent it from being turned by hand or through some other external force while the traverse deck is in the up position.

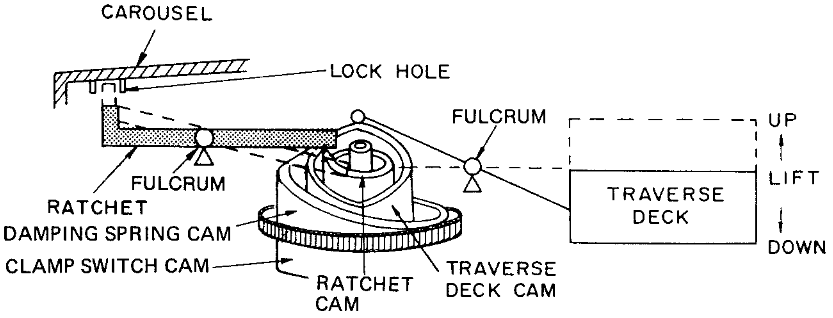


**Figure 15 Traverse Deck Up/Down Construction**

1) As shown in the figure above, if the traverse deck is in the lowermost position, the carousel is unlocked and cam be turned by hand (solid lines).

2) When the cam block turns and the traverse deck is lifted up, the left side of the ratchet also rises up as indicated by the dashed lines, and the left end of the ratchet enters the lock hole provided on the inside of the carousel, thus locking the carousel to prevent it from being turned by hand.

B) Damping spring cam

This cam is held down by the damping spring, and it applies a brake to prevent the cam block from turning too far during the various operations of the mechanism.